1.0 INTRODUCTION

This part describes the safe shutdown analysis methodology used to identify, select, and analyze the systems, components, and cables needed to demonstrate compliance with Appendix R to 10CFR50, and the applicable NRC generic letters.

Paragraph 50.48(a) & (e) and Appendix R of 10CFR50 became effective on February 17, 1981 and requires all nuclear plants licensed to operate prior to January 1, 1979 to comply with the requirements of 10CFR50 Appendix R Sections III.G, III.J, and III.O. SQN was licensed after this date and must comply with these sections of Appendix R. Additionally, by a Unit 2 license condition, SQN must comply with Sections III.G, III.J, III.L, and III.0 of Appendix R.

Section III.G.1 requires that fire protection features be provided for those systems, structures, and components important to safe shutdown. These features must be capable of limiting fire damage so that:

(1) One train of systems necessary to achieve and maintain hot shutdown conditions from either the Control Room or the Emergency Control Station(s) is free of fire damage; and,

(2) Systems necessary to achieve and maintain cold shutdown from either the Control Room or the Emergency Control Station(s) can be repaired within 72 hours.

Where alternative shutdown capability is required (i.e., for control building fires that require shutdown from outside of the Control Room), cold shutdown must be achieved within 72 hours. Alternate shutdown capability is evaluated per Appendix R Sections III.G.3 and III.L. Plant locations that do not require alternative shutdown capability are evaluated per Section III.G.2 of Appendix R. Generic Letter 81-12 (February 20, 1981) Enclosure 1 "Staff Position", provides additional guidance on the NRC's requirements for safe shutdown capability.

1.1 Design Basis Evaluation

The purpose of this evaluation is to demonstrate fire safe shutdown capability for postulated fires involving in situ and/or transient combustibles that could impact systems, structures, or components located in or adjacent to that area. For purposes of this evaluation, it is assumed that these fires may adversely affect these systems, structures or components essential to safe shutdown. The availability of offsite power for specific systems and/or fire scenarios has been evaluated for non-alternative shutdown locations. Loss of offsite power, as well as offsite power available, has been assumed for control building fires, for which alternative shutdown is provided. No concurrent or sequential design basis accidents or transients are assumed to occur. Failures that are a consequence of the fire are evaluated. No additional single failures are assumed (ref. 11.1.1).

1.2 Limiting Safety Consequences

The limiting safety consequences used in the evaluation of fire safe shutdown are: (1) no fuel failure due to calculated cladding temperature increases; (2) no rupture of any primary coolant boundary; (3) no rupture of the containment boundary; (4) following the event, the reactor coolant system process variables shall be within those predicted for a loss of normal ac power; and (5) shutdown capability shall be able to achieve and maintain subcritical conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby conditions for an extended period of time, achieve cold shutdown conditions within 72 hours with equipment powered by onsite power sources if using alternative shutdown methods, and maintain cold shutdown conditions thereafter (ref. 11.1.1).

Generic Letter 81-12, Enclosure 1, specifies the performance goals and associated safe shutdown functions necessary to ensure the limiting safety consequences of the fire safe shutdown analysis. Other subfunctions may exist under each of these broad headings. Examples of such subfunctions are steam generator secondary side isolation, and reactor coolant system (RCS) seal injection. Other subfunctions such as on site emergency power, environmental control, etc., are included as support functions.

The performance goals and safe shutdown functions identified in the generic letter adequately ensure that the containment pressure boundary will not be threatened. Uncontrolled mass and energy releases to the containment from the primary systems are limited by the achievement of these safe shutdown functions and will ensure that no rupture of the reactor coolant or containment pressure boundaries will occur.

2.0 SAFE SHUTDOWN FUNCTIONS

This section provides a brief overview of the SQN safe shutdown functions. The specific safe shutdown functions necessary to satisfy the performance goals and safe shutdown functions of Appendix R as identified in Enclosure 1 to Generic Letter 81-12 are:

(1) Reactivity control function
(2) Reactor coolant makeup function
(3) Reactor coolant pressure control function
(4) Decay heat removal function
(5) Process monitoring function
(6) Support function

2.1 Reactivity Control

Reactor trip capability is by inserting control and shutdown rods into the reactor. After a reactor trip, the reactivity control system (boration) must be capable of achieving and maintaining adequate shutdown reactivity from zero power hot standby to cold shutdown. The function must be capable of compensating for any reactivity changes associated with xenon decay and reactor coolant temperature decrease which occur during cooldown to cold shutdown conditions.

2.2 Reactor Coolant Make-up

The reactor coolant make-up systems shall be capable of assuring that sufficient make-up inventory is provided to compensate for reactor coolant system (RCS) fluid losses due to identified leakage from the reactor coolant pressure boundary and shrinkage of the RCS water volume during cooldown from hot standby to cold shutdown conditions. Adequate performance of this function is demonstrated by the maintenance of reactor coolant level within the pressurizer.

2.3 Reactor Coolant Pressure Control

Reactor coolant pressure control is required to assure that the RCS is operated:

(1) Within the technical specifications for RCS pressure-temperature requirements;

(2) To prevent peak RCS pressure from exceeding 110% of system design pressure; and
(3) With a sufficient subcooling margin to minimize void formation within the reactor vessel.

2.4 Decay Heat Removal

The decay heat removal systems shall be capable of transferring fission product decay heat from the reactor core at a rate such that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. The function shall be capable of maintaining hot standby using AFW for 72 hours, achieving cold shutdown (within a 72-hour period for alternate shutdown), and maintaining cold shutdown conditions thereafter using residual heat removal (RHR).

2.5 Process Monitoring

When information on process variables is required by operators to achieve/maintain safe shutdown system or control safe shutdown equipment, such monitoring information must be available. The process monitoring function shall be capable of providing, if possible, direct readings of those plant process variables necessary for plant operators to perform and/or control the previously identified functions.

2.6 Support

The systems and equipment used to perform the Fire Safe Shutdown (FSSD) functions may require miscellaneous support functions such as process cooling, lubrication and ac/dc power. These supporting functions shall be available and capable of providing the support necessary to assure acceptable performance of the FSSD functions.

3.0 ANALYSIS OF SAFE SHUTDOWN SYSTEMS

3.1 Introduction

Various analytical approaches ensure that sufficient plant systems are available to perform the FSSD functions. Numerous plant systems are available, alone and in combination with other systems, to provide these required functions. A minimum set of plant systems and components is identified to demonstrate that the plant can achieve and maintain safe shutdown. In addition, for control building fires that require shutdown from outside of the main control room, the concurrent loss of off-site power is also assumed. Providing adequate protection of this minimum system, component, and cable set from the effects of postulated fires constitutes an adequate and conservative demonstration of the ability to achieve and maintain safe shutdown for the purpose of fire protection.

The safe shutdown systems selected are capable of:

a) achieving and maintaining subcritical conditions in the reactor,
b) maintaining reactor coolant inventory,
c) achieving and maintaining hot shutdown conditions for an extended period of time,
d) performing cold shutdown repairs needed to achieve and maintain cold shutdown (or, for control building fires that require shutdown from outside of the main control room, achieving cold shutdown conditions within 72 hours), and
e) maintaining cold shutdown conditions thereafter.

3.2 Initial Assumptions

(1) The unit is operating at 100% power upon the occurrence of a fire.

(2) For alternative shutdown locations (Control Building fires that require shutdown from outside of the Control Room), a loss of off-site power is assumed.

(3) The reactor is tripped either manually or automatically.

(4) No failures are considered other than those directly attributable to the fire.

(5) Equipment required for safe shutdown is assumed tobe operable (i.e., not out of service).

3.3 Definitions

Hot Standby (Mode 3)	The initial safe shutdown state with the reactor at zero power, K_{eff} less than 0.99 and average RCS temperature T_{avg} greater than or equal to 350°F.
Hot Shutdown (Mode 4)	Reactor at zero power K_{eff} less than 0.99 and average RCS temperature T_{avg} between 350°F and 200°F.
Cold Shutdown (Mode 5)	Reactor at zero power, K_{eff} less than 0.99 and average RCS temperature T_{avg} below or equal to 200°F.
Subcooling Margin	The difference between the saturation temperature at RCS pressure, and the maximum temperature in the hot legs.

3.4 Safe Shutdown Functions

The following is a comparison of the Generic Letter 81-12 safe shutdown functions and the corresponding safety functions used in the Appendix R FSSD analysis (ref. 11.2.1):

GL 81-12 Safe Shutdown Function	SQN Safety Functions
Reactivity Control	Initial Reactivity Control Long Term Reactivity Control
Reactor Coolant Makeup Control	RCS Inventory Control RCP Seal Integrity RCS Pressure Boundary Control RCS Makeup and Letdown
Reactor Coolant Pressure Control	RCS Inventory Control RCS Pressure Boundary Control RCS Makeup/Letdown
Decay Heat Removal	SG Inventory Control

	Secondary Side Pressure Control Secondary Side Isolation Long-Term Heat Removal
Process Monitoring Instrumentation	(no specific correlation, in logic by system)
Support	Onsite Electrical Supply Environmental Control (Process Cooling, in logic by system)

Each plant system or subsystem function relied on to accomplish the above safe shutdown functions is identified (ref. 11.2.1). A separate designator identified as a safe shutdown "Key" is assigned to each plant system or subsystem function. Figure III-1 "Appendix R Safe Shutdown Logic Diagram" depicts the safe shutdown system and/or system function, associated Key number, and logical relationships between systems and Keys used to demonstrate compliance with Appendix R criteria. The correlation between Keys and safe shutdown systems is provided in Section 4. The following sections provide a general description of the methods and systems used in reference 11.2.1 to satisfy the safe shutdown performance goals and functions as delineated in Generic Letter 81-12.

3.4.1 Reactivity Control

At least one source range neutron monitor is provided for indication of count rate to verify the reactor is subcritical.

Initial reactivity control will result from an automatic reactor protection system (RPS) trip or from operator initiation of a manual trip upon notification of a major fire affecting safe unit operation. This action will deenergize the normally energized control rod drive mechanisms (CRDMs) to actuate a reactor trip. The RPS has a diversity of inputs, each of which "fails safe" and will actuate on an open circuit or a loss of power. As such, fire damage to the RPS will not preclude the initiation of an automatic trip or control rod insertion. There are four paths to manually trip the reactor. There is a shunt trip path for each of the two trains and an undervoltage trip path for each of the two trains. The shunt trip path trips the reactor by energizing the shunt trip coil in the reactor trip switchgear through a handswitch contact in the main control room. The undervoltage trip path trips the reactor by deenergizing the undervoltage trip coil in the reactor trip switchgear through a handswitch contact in the main control room. For an undervoltage trip path to fail, a perfect short to another power source must occur. For a shunt trip path to fail, the path must be open without shorting. It is therefore considered incredible that all four paths will fail in the specific manner to disable each representative path, particularly since the trip handswitches in the main control room utilize all four paths simultaneously when placed in the trip position.

Following rod insertion, additional negative reactivity insertion is required as xenon decays, and RCS temperature is decreased. The addition of borated water from the refueling water storage tank (RWST) is required to maintain the required shutdown reactivity. The chemical and volume control system (CVCS) is capable of injecting borated water into the RCS and the normal, excess, and alternate letdown paths (reactor vessel head vents (RVHV), power operated relief valves (PORVs)) are capable of sufficient letdown to monitor shutdown reactivity.

3.4.2 Reactor Coolant Make-up Control

For the assumed fire scenario, reactor coolant make-up control can be achieved by the following to assure that primary side inventory (pressurizer level) is maintained:

1. One centrifugal charging pump (CCP), including emergency raw cooling water (ERCW) and room cooling for appropriate CCP must be operational.

2. A suction path from either the volume control tank (VCT) or the RWST to the CCPs must be available.

3. Charging flow control valve or a bypass must be available (manual operation of by pass valves is acceptable) and pressurizer level indication.

4. A charging path to the RCS through reactor coolant pump (RCP) seal injection.

5. Cooling to the RCP seals through either RCP seal injection or RCP thermal barrier cooling.

6. RCS pressure boundary isolation for normal and excess letdown, reactor head vent, RHR suction, pressurizer PORV's

7. Pressurizer level instrumentation.
8. RCS Letdown (Normal/Excess/Alternate)

3.4.3 Reactor Coolant Pressure Control

Establishing and maintaining a sufficient subcooling margin within the RCS is required to prevent void formation in the core and to ensure the ability to maintain natural circulation (if the RCPs are not operable) through the steam generators. Overpressure protection of the RCS is provided by the pressurizer safety valves prior to a controlled cooldown and depressurization. During cooldown from Mode 3 hot standby (above 350 °F) to Mode 4 hot shutdown (below 350 °F), pressure control may be by pressurizer heaters or by varying pressurizer level in combination with control of SG pressure and RCS temperature using SG PORVs. Pressure may also be reduced by normal/excess/alternate letdown paths. To ensure adequate RCS pressure and adequate subcooling margin, the operator will isolate the normal pressurizer spray valves, or trip the RCPs to limit depressurization, and isolate the pressurizer PORVs and auxiliary spray. Entering Mode 4 will permit aligning the RHR system to the RCS for decay heat removal. While on RHR, the maximum pressures in both the RHR and RCS systems are limited by the RHR system safety valves.

RCS temperature indication is provided for the two loops used for cooldown and one RCS wide range pressure indicator is provided. Note that RCS cold leg temperature is not provided in the ACR. (See deviation in Part VII.)

3.4.4 Decay Heat Removal

Following a reactor trip with loss of off-site power (either assumed or caused by the fire), decay heat is initially removed by natural circulation within the RCS, heat transfer to the main steam system via the steam generators, and operation of the steam generator PORVs or lift of the main steam system code safety valves. The secondary side of the SGs are isolated from the main turbine, main feedwater pumps, and other steam loads to prevent excessive heat removal from the RCS.

For decay heat removal via natural circulation a minimum of two steam generators will be available (including SG pressure and level indication). Decay heat removal requires the ability to supply sufficient auxiliary feedwater to the steam generators to make up for the inventory discharged as steam by the safety valves or steam generator PORVs. For maintenance of initial hot standby conditions, the feedwater flow required to the steam generators is supplied by the auxiliary feedwater (AFW) system. AFW sources are available from the condensate storage tanks, and alternatively, from the essential raw cooling water (ERCW) system. AFW may be supplied to the steam generators by the motor-driven AFW pumps and/or by the turbine-driven AFW pump. Continued heat removal is achieved by the controlled operation of the PORVs and continued operation of the AFW system. After reduction of RCS temperature to 350 °F, the RHR system is used to establish long-term core cooling by the removal of decay heat from the RCS to the environment via the RHR, CCS, and ERCW systems.

3.4.5 Process Monitoring Instrumentation

The operator requires knowledge of various plant parameters to perform required system transitions and essential operator actions. A discussion by safe shutdown function of the necessary instrumentation is provided below.

For the fire scenarios assumed in this analysis, inventory make-up to the RCS will be from the refueling water storage tank through the RCP seal injection lines. Sufficient initial negative reactivity exists in the RCS after control rod insertion. The negative reactivity inserted by the control rods and borated water injected by the CVCS will maintain the core subcritical while cooling down from hot full power to cold shutdown. Core source range detectors will be available for core reactivity monitoring in the main control room. Source range channel indication is available in the auxiliary control room to provide this information for fires in control building areas requiring alternative shutdown.

Various process monitoring functions must be available to adequately achieve and maintain the reactor coolant makeup, pressure control and decay heat removal functions. For the assumed fire scenario, maintenance of hot standby requires that pressurizer level and RCS pressure instrumentation be available. RCS temperature is maintained during hot standby by proper decay heat removal via steam generators using the steam generator PORVs. When the reactor coolant pumps are tripped and cooling is required in the natural circulation mode of operation, the difference between the hot-leg and cold-leg wide range temperatures (or saturation temperature for SG pressure) provides indication of the existence of a natural circulation condition.

RCS hot and cold leg temperature instrumentation is available for use given a fire that does not require MCR abandonment. For alternative shutdown, steam generator (SG) pressure instrumentation is required in order to provide a means of determining RCS cold-leg temperature from the ACR. (Refer to Part VII for the deviation request associated with using T_{sat} in lieu of direct indication of T_c in the ACR.) During RCS cooldown, SG pressure will be controlled to maintain desired RCS temperature by control of the SG PORVs.

Operating personnel will maintain RCS pressure to assure that appropriate subcooling margin is achieved by monitoring of RCS pressure and hot leg temperature (T_h) instrumentation. Manual control of the pressurizer heaters will be used if available, but is not required for safe shutdown. Pressurizer level control is maintained by monitoring pressurizer level instrumentation and manual control of CVCS charging flow through the RCP seals.

The above methods of controlling primary system parameters by means of the secondary system requires monitoring secondary system parameters. Steam generator level and pressure indicators are available for the loops being used for cooldown to assure adequate and controlled decay heat removal.

The plant operators will utilize the instrumentation discussed above for monitoring natural circulation conditions, subcooling margin, and heat removal.

3.4.6 Support Functions

The support functions for various safe shutdown equipment or systems are provided by the following systems:

(1) Emergency Power Distribution System
(2) Onsite Electric Supply
(3) Essential Raw Cooling Water System
(4) Component Cooling Water System
(5) Ventilation to areas containing essential fire safe shutdown equipment
(6) Control Air System

The following sections discuss the required safe shutdown systems and support systems.

4.0 SAFE SHUTDOWN SYSTEMS

The FSSD systems are identified by reference 11.2.1 and are listed by Key in Table III-1 and summarized as follows:

4.1 Chemical and Volume Control System (CVCS) - Keys 1, 2, 4, 5, 6, 9, 34

The charging portion of the Chemical Volume and Control System (CVCS) accomplishes the following safe shutdown functions:

(1) Reactivity control by injection of boron into the RCS
(2) Reactor coolant make-up control by seal injection
(3) Maintenance of reactor coolant pump seal integrity

Reactivity control for safe shutdown is initially provided by the control rods, with subsequent boron injection used to compensate for the xenon decay and positive reactivity insertion due to cooldown. Insertion of the control and shutdown rod groups make the reactor adequately subcritical following trip from any credible operation condition to the hot zero power condition, even assuming the most reactive rod remains in the fully withdrawn position.

For the assumed post-fire scenario, make-up water to the RCS will be provided by the CVCS initially from the VCT and then from the RWST. When the unit is at power, the concentration of boron in the RWST exceeds that quantity required to bring the reactor from an initial hot standby condition to hot shutdown and then to cold shutdown.

Numerous CVCS paths are normally available for charging to the RCS (normal charging, seal injection, ECCS charging). The post-fire flow path normally qualified to provide reactor coolant make-up and boration is the charging line to the reactor coolant pump seals. This path will be available by ensuring that at least one of the charging pumps is operable and charging flow control valve remains open or is manually bypassed.

For the assumed event, charging and boration will be accomplished by operating a minimum of one centrifugal charging pump taking suction from the RWST and injecting borated water through the RCP seal injection line to the RCS. Suction to the charging pump can be delivered from the RWST by opening either one of two normally closed motor-operated valves.

Letdown from the RCS normally occurs via the seal leak-off return path and the normal and/or excess letdown paths. For the post-fire operational scenario, the normal and excess letdown paths may be isolated. Isolation of the normal and excess letdown lines may occur as a result of loss of instrument air or may be achieved by operator action to assure adequate inventory control. Procedural controls ensure isolation of all potentially spurious RCS letdown paths, including pressurizer PORVs and reactor head v ents as necessary.

The injection path from the CCP to the RCP seals contains the charging flow control valve (normally open) which is provided with a minimum-flow stop on the controller. Thus, operation of one charging pump will ensure availability of minimum RCS charging flow.

Isolation of the VCT by closure of either one of two motor-operated valves during makeup from the RWST can be performed either remotely or by local manual operation. The VCT is isolated to prevent introduction of H_2 covergas into the CCP suction in the event of VCT drainage.

Pressurizer water level is maintained by operation of one CCP using pressurizer level instrumentation. The two high-head centrifugal charging pumps are normally available for the CVCS charging function and have a miniflow path through the seal water heat exchanger. The pumps require ERCW to the gear oil coolers and pump bearing oil coolers. The CCP room coolers require ERCW.

The capacity of the refueling water storage tank is based on ECCS injection and for filling the refueling cavity. This quantity is in excess of that required for makeup due to fire safe shutdown requirements.

4.2 Reactor Coolant System - Keys 7, 8, 28, 48

The RCS consists of four similar heat transfer loops connected in parallel to the reactor vessel. Each loop contains a RCP and a steam generator. In addition, the system includes a pressurizer with associated code safety and power-operated relief valves (PORVs). RCS instrumentation includes wide range cold-leg (except in ACR) and wide range hot-leg temperatures indication, pressure indication, and pressurizer water level indication.

The natural circulation capability of the plant provides a means of decay heat removal when the reactor coolant pumps are unavailable. Natural circulation flow rates are governed by the amount of decay heat, relative component elevations, primary to secondary heat transfer, loop flow resistance, steam generator and RCS inventories, and any RCS voiding. These conditions determine whether adequate primary to secondary heat transfer and subcooling during natural circulation can be maintained.

For this analysis of safe shutdown capability, two of the four RCS loops (for which steam generator level and pressure are controlled) will be available to ensure that natural circulation is established and maintained. Additionally, RCPB isolation is provided to ensure subcooling margin is maintained. RCPB consists of isolation of normal letdown, excess letdown, pressurizer PORVs or blocks, RVHV and RHR letdown. Refer to the discussion on High/Low pressure boundary interfaces in Section 8.0 of this part.

While in natural circulation, adequate heat transfer and coolant flow are dependent on adequate inventory in both the primary and secondary systems. Maintaining water level in the secondary side of the steam generators and adequate level within the pressurizer are required for natural circulation. RCS loop temperatures confirm flow and heat transfer while in natural circulation.

RCS inventory control is based on the operation of CVCS charging paths as previously described. Maintenance of either seal injection or thermal barrier cooling provides adequate protection of the RCP seals. Letdown is provided to allow for a method of depressurizing the RCS and further boration of the RCS. Letdown path options include normal letdown, excess letdown, RCP seal return, RVHV and pressurizer PORVs.

The pressurizer heaters are not required to operate for safe shutdown. Alternate means of controlling RCS pressure are available. However, should the pressurizer heaters be available, subcooling within the RCS can be maintained by controlled operation of the pressurizer heaters. The availability of pressurizer heaters will enhance the capability of controlling RCS pressure and subcooling margin.

4.3 Main Steam Systems - Keys 20, 21, 22, 23, 24, 25, 26

For the post-fire scenario, maintenance of the steam generator inventory and control of steam generator pressure are required for both hot standby and subsequent primary system cooldown to support the decay and sensible heat removal function, within the applicable operational limits, until initiation of RHR to bring the plant to cold shutdown.

The main steam (MS) system consists of four parallel flow paths, one from each steam generator to the main turbine of the unit. The MS system will be isolated either by operation of the turbine stop and control, dump, reheat, feed turbine stop and control, and gland steam valves; or by the main steam isolation valves.

The main feedwater system will be isolated byeither the main feedwater isolation valve(MFIV), or regulating valves and bypasses, or trip of themain feedwater (MFW) pumps.

Inventory control of two steam generators provides the reactor heat removal function during natural circulation conditions. Maintenance of the steam generator water level during the period of AFW operation (hot standby) involves positioning of AFW valves and operation of the motor-driven and/or turbine-driven AFW pumps. Steam generator water level and pressure indication are available in the MCR and in the ACR.

The MS system also delivers motive steam to the turbine-driven AFW pump. Steam to the turbine is supplied by branch connections upstream of the main steam isolation v alves on two steam lines (corresponding to steam generators No. 1 and 4). Either line is sufficient to supply steam for the AFW pump turbine.

A PORV provided on each steam line is capable of releasing the sensible and decay heat to the atmosphere. The SG PORVs are used for plant cooldown by steam discharge to the atmosphere since the steam dump system is assumed to be unavailable. The SG PORVs have a total combined capacity of approximately 10% of the maximum steam flow. For the assumed fire scenario, a minimum of two PORVs will be available to support controlled cooldown of the Reactor Coolant System. Controls for the steam generator PORVs are provided in the MCR and locally at the shutdown stations.

4.4 Auxiliary Feedwater System - Keys 11, 12, 14, 15, 16 17, 19

The AFW system is required during hot standby to support RCS decay heat removal. For hot standby, secondary system (steam generator) inventory control is provided by the AFW system. Two motor-driven pumps and one turbine-driven pump are available to each unit.

The AFW system is designed to deliver enough water to maintain sufficient heat transfer in the steam generators in order to prevent loss of primary water through the RCS pressurizer safety or relief valves.

The turbine-driven AFW pump is designed to deliver sufficient flow to all four steam generators and maintain steam generator water levels. Steam generators No. 1 and/or 4 provide motive steam to the turbine-driven AFW pump. The turbine-driven AFW pump is capable of operating down to a steam pressure of 90 psia, which is below the point at which the RHR system can be placed in service.

Each unit is supplied with two motor-driven AFW pumps with only one required for safe shutdown. Pump A supplies SGs 1 and 2 and B supplies SGs 3 and 4.

The Condensate Storage Tank (CST) contains a minimum volume of water required by the plant technical specification. As a backup, cross-ties to the ERCW are provided. Ample time is available post-fire for realignment of the normally closed valves that isolate ERCW from the suction of the AFW pumps.

4.5 Residual Heat Removal System - Keys 30, 31, 40

The RHR system is designed to remove residual and sensible heat from the core by reducing the temperature of the RCS during the hot shutdown and cold shutdown modes.

The RHR system consists of two RHR heat exchangers, two RHR pumps and associated piping, valving and instrumentation necessary on each unit.

During hot shutdown and cold shutdown operations, reactor coolant flows from the RCS to the RHR pumps, through the tube side of the RHR heat exchangers and back to the RCS. The heat load is transferred to CCS on the shell side of the RHR heat exchangers.

Two series motor-operated valves (FCV-74-1,-2) isolate the inlet line to the RHR system from the RCS. To avoid potential RCS boundary leakage at this high/low pressure interface, both of the motor-operated valves in the RHR suction line will be kept closed (pre-fire condition) with the corresponding motor control center breaker in the open position. The return lines are isolated by two series check valves and a motor-operated valve in each return line.

A minimum-flow line from the downstream side of each RHR heat exchanger to the corresponding pump's suction line is provided to assure that the RHR pumps do not overheat under low flow conditions. A motor-operated valve located in each minimum flow line is opened if RHR pump flow falls below a low set point and will be closed when the flow increases above a high set point.

The cooldown rate of the reactor coolant is controlled by regulating the flow through the tube side of the RHR heat exchangers. A bypass line, which serves both residual heat exchangers, is used to regulate the temperature of the return flow to the RCS as well as to maintain a minimum flow through the RHR system.

The RHR system can be placed in operation when the pressure and temperature of the RCS are about 380 psig and 350^{0}F, respectively. If one of the two RHR pumps and/or one of the two RHR heat exchangers is not operable, safe operation of the plant is not affected; however, the time for cooldown is extended.

Each RHR pump is sized to deliver sufficient reactor coolant flow through the residual heat exchangers to meet the plant cooldown requirements. A seal heat exchanger for each pump is cooled by CCS. RHR pump room cooling is provided by a room cooler and ERCW. Local handwheel operation of all RHR valves requiring realignment for cooldown is acceptable based on the time to achieve cold shutdown.

The RHR system safety valves (although not specifically listed in the shutdown logic) are available to provide RHR and RCS cold overpressure protection whenever the RHR system is in operation.

4.6 Safety Injection System Accumulators - Key 36

During normal plant operating conditions, the safety injection system accumulators are pressurized by nitrogen gas in order to inject borated water into the RCS when RCS pressure falls below 600 psi due to a LOCA. During a controlled depressurization, the accumulators are isolated to prevent injection of safety injection system accumulator borated water and nitrogen gas into the RCS. Injection of nitrogen into the RCS occurs when RCS pressure is less than 150 psi.

The manual isolation of the accumulators or nitrogen gas venting to depressurize the accumulators is assumed as a post-fire activity. The isolation v alve at each accumulator is closed only when the RCS is intentionally depressurized below 1000 psig. If the cables associated with these valves were damaged by fire, the accumulators are vented. The isolation or venting may be locally, governed by appropriate plant procedures (post-fire). In the event the valves are inaccessible, RCS pressure will be maintained greater than 150 psi to preclude nitrogen injection into the RCS via the accumulators.

4.7 Component Cooling Water System - Key 1, 9, 31

CCS is a supporting system to other safe shutdown systems. Two redundant paths are available, each consisting of pump(s), heat exchanger(s), surge tank(s) and associated v alves, piping and local instrumentation. The CCS system serves as an intermediate heat transfer loop between the various safe shutdown components and the Essential Raw Cooling Water System (ultimate heat sink).

The CCS system provides cooling for the following safe shutdown equipment:

(1) Residual Heat Removal exchangers
(2) Centrifugal charging pumps mechanical-seal heat exchangrs
(3) Residual heat removal pumps mechanical-seal heat exchangers
(4) Reactor coolant pump thermal barrier heat exchanger (loaded on train A CCS only)

One pump and one or two component cooling heat exchangers fulfill the heat removal function during normal full-load operation and post fire SSD for various components located in the auxiliary and reactor buildings.

Other than the RHR heat exchangers, the essential loads are normally valved open to the supply header and discharge to the suction of the CCS pump with which they are normally associated, so that component cooling water is circulated continuously through the essential loads during normal operation.

The CCS outlet from the RHR heat exchangers have motor-operated valves which must be opened or remain open during RHR cooldown. The motor-operated valves that isolate the RCP thermal barrier coolers (Train A CCS only) are included as safe shutdown components for operational flexibility in a post-fire scenario, since the thermal barriers may be required to perform a diverse function to RCP seal injection.

4.8 Essential Raw Cooling Water System - Key 3 (additional ERCW is Keys 1, 9, 13, 19, 37, 40)

The ERCW system provides cooling for the following safe shutdown heat transfer equipment (additional equipment in other keys):

(1) Component cooling heat exchangers

(2) Emergency diesel generator heat exchangers
(3) Essential ventilation coolers and water chillers

The system also provides a back-up supply of water to the AFW pump suction in the event that the condensate storage tank is depleted.

This system consists of four traveling water screens and their wash pumps, eight pumps, four discharge strainers, four main supply headers (1A, 1B, 2A, and 2B) and 2 discharge headers (A, B). These components, together with the associated heat exchangers, valving, piping and instrumentation, complete the ERCW system.

There are four ERCW pumps per train. Interlocks exist to preclude starting more than one ERCW pump on a single diesel generator. Two ERCW pumps are required per train and one train is required for FSSD.

4.9 Essential HVAC - Keys 37A, 37B, 37C, 37F, 37K, 37N, 37O, 37S

Essential HVAC is provided for the control, auxiliary, diesel generator, and reactor buildings. Portions of the systems in each building that service safe shutdown equipment required for compliance with Appendix R have been analyzed to determine if HVAC is required and to ensure that at least one path of the required systems will be available for an Appendix R fire when required. The systems consist of filters, fans, ductwork, dampers, heating/cooling coils, instrumentation, and controls for general building v entilation, along with separate systems for individual rooms. The required systems, components, and cables for those subsystems relied on to protect equipment for safe shutdown have been incorporated into the Appendix R analysis as required equipment and cables. The location of equipment and routing of cables has been identified and evaluated as described in Sections 5 and 6 of this Part. These systems are discussed below.

The primary safety-related portions of the control room are cooled by two independent trains of HVAC. The two trains are separated by fire barriers and/or separation distance in accordance with Appendix R requirements to ensure that the control building HVAC system will remain functional during a fire in the auxiliary building except as provided by an approved deviation. Alternate shutdown is provided for a fire in the control building. The HVAC system in the control room is separate from the HVAC system servicing the ACR.

Portions of the auxiliary building HVAC system is required to achieve and maintain hot standby with subsequent cold shutdown. HVAC is required for the 480V transformer rooms (Key 37K). Individual room coolers are also required for the CCP and RHR pumps and are addressed in the equipment logics for their respective systems (Keys 1 and 40). Temporary ventilation may be used to replace fire damaged HVAC and heat loads may be reduced.

The TDAFW pump room is provided with a DC operated exhaust fan (Key 37N) sized to provide the required air flow in the room for the volume method of cooling. The fan is a roof ventilator type with intake and venting to the general area of the Auxiliary building. The fan will automatically start upon the start the TDAFW pump. If fans are not operable due to fire damage on fan electrical circuits, adequate venti lation can be achieved by opening the double doors to the room.

The diesel generator HVAC systems serve each combination of diesel, generator and associated batteries and electrical boards. The diesel generator building HVAC system consists of various subsystems.

The subsystems for each combination include diesel generator room HVAC subsystems, generator and electrical panel subsystems, battery hood exhaust subsystems, electric board room exhaust and heating subsystems, and muffler room exhaust systems. A fire in any combination of diesel generator and associated batteries and electrical boards, which are separate fire areas, will not affect the HVAC systems servicing the adjacent combinations of diesel generator and associated batteries and electrical boards.

All other areas of the plant which contain equipment required for safe shutdown per Appendix R have been evaluated and determined that acceptable temperatures will be maintained for the required equipment to perform its intended FSSD function if HVAC is lost. Some areas require operator action to turn out normal lighting and other electrical loads to reduce the heat load. (i.e. Auxiliary Instrument Room K37B, 480V Board and Battery Rooms K37F, AFW/CCS and AFW/BAT Space Coolers K37O, CCS/SFP Space Cooler K37P).

4.10 Electrical Power System - Key 38, 39

The plant Emergency Power System (EPS) includes on-site, independent, automatically-starting emergency power sources that supply power to essential safe shutdown equipment if the normal off-site power sources are unavailable.

The emergency power sources consist of four 6.9kV diesel generators. Each consists of a single generator driven by two engines on a common shaft. Each diesel engine is equipped with its own auxiliaries. These include batteries, starting air, fuel oil, lube oil, cooling water, intake and exhaust system, speed regulator (governor) and controls. Cooling water is provided from the ERCW system.

4.10.1 6.9KV Shutdown Power System

Each of the four 6.9kV shutdown boards is normally fed from 161kV/6.9kV common station service transformers (CSSTs) that receive power from offsite sources. Each of four 6.9kV shutdown boards can also be fed from the corresponding 6.9kV diesel generator. Loss of offsite power to the 6.9kV boards is sensed by undervoltage relays. Upon sensing an undervoltage, the master relay(s) automatically start the emergency generators, trip the normal feed switchgear breakers and trip all motor feeder breakers on the boards. The generators can also be manually started locally, from the MCR, or from the ACR. For shutdown scenarios that do not require MCR abandonment, a switchgear breaker on each board is automatically closed when its diesel generator is at rated speed and rated v oltage and reenergizes the bus. The essential loads are sequentially connected to the bus. For shutdown scenarios from the ACR, breaker closure and diesel generator loading is done manually. The diesel generators will then supply all equipment which must operate under emergency conditions for the respective safeguard train.

4.10.2 480V AC Shutdown Power System

The 480V shutdown power system distributes power for low voltage station service demands. The normal source of power is the 6.9kV shutdown boards via the 6.9kV/480V transformers.

The 480V shutdown power system consists of eight boards, two per unit per train. Each 480V board is fed from the associated unit/train 6.9kV shutdown board through the normal or spare 6.9kV/480V transformers. The 480V shutdown boards feed 480V loads and v arious MCCs. The MCCs in turn feed various motor operated v alves and other loads required for safe shutdown. Each MCC has a normal and alternate power source that can be utilized when needed.

4.10.3 120V AC Vital Instrument Power System

The 120V AC Vital Instrument Power System consists of four separate vital boards per unit. Each 120V AC Vital Bus is supplied by an independent inverter. Each vital battery supplies two inverters (one per unit of the same channel) plus a standby spare shared between units for each channel. Each inverter is normally supplied by the 480V AC power system of the associated train, which is rectified and auctioneered using diodes with its respective 125V dc battery board. The spare inverter can be manually aligned as a replacement for either of the normal inverters. The spare inverter can be supplied 480V AC from either train via a manual transfer switch.

The output of each inverter is connected to its 120V AC vital instrument power board. The vital instrument power board can be supplied from its normal inverter or the spare inverter via a manual transfer switch located on the board. The vital instrument power boards supply all of the required normal safe shutdown instrumentation per channel.

4.10.4 125V DC Power System

The 125V dc power system consists of four battery banks, four normal chargers, two spare chargers, and four main dc battery boards. The 125V dc power system supplies power for control of 6.9kV/480V shutdown boards, operation of vital inverters, pneumatic-operated solenoid controlled valves, and selected emergency lights. The battery system consists of four separately located sets of batteries powering four channels of dc boards. Each normal vital battery has its own normal charger. Each vital battery board can also be supplied from one of two spare chargers. The battery chargers are energized from normal or alternate MCCs via a manual transfer switch. A fifth vital battery may be used as an installed spare and can be placed into service in place of any of the four normal vital batteries. The fifth vital battery is maintained by its own charger until connected to one of the normal vital battery boards.

During normal operation, the 125V dc loads are fed from the battery chargers, with the batteries being supplied a "trickle" charge floating on the system. Upon loss of ac power, the entire dc load is drawn from the batteries. However, the battery chargers can be manually aligned to alternate power sources to take over the load and recharge their associated battery.

All direct current loads associated with engineered safeguards equipment are fully redundant. These loads are arranged so that each battery supplies its associated channel.

4.10.5 250V DC Power System

The 250V dc power system consists of two battery banks, two normal chargers, a spare charger, and two 250V dc battery boards. Control power for nonsafety-related power circuit breakers and associated protective relays is distributed from the 250V dc supply via circuit breakers on the turbine building dc distribution boards. The 250V dc power system provides power for non-safety-related loads and, for Appendix R fire scenarios, is used to operate steam load trip circuits and to provide capabilities to trip the RCPs.

4.11 Operator Integrity - Key 41

Sufficient operator communication channels, emergency lighting, and security system access has been guaranteed for the FSSD.

4.12 Reactor Trip - Key 29

A fire inside or outside of the control building may require a reactor trip to bring the plant to hot standby. Reactor trip breaker A or B may be tripped by the handswitches in the MCR. Also, the reactor may be tripped using the motor-generator set breaker A and B. The reactor trip provides sufficient initial reactivity control. Long term reactivity control is accomplished by preventing boron dilution and assuring that injected makeup water is at least the boron concentration of the RWST.

The reactor can be manually shut down from the main control room, or if the fire damages the reactor trip breakers, the reactor can be manually shut down by de-energizing the control rod drive motor-generators. There are four paths to trip the reactor. For each of two trains, there is a shunt trip path and an undervoltage trip path. The shunt trip path trips the reactor by energizing the shunt trip coil in the reactor trip switchgear through a handswitch contact in the main control room. The undervoltage trip path trips the reactor by de-energizing the undervoltage trip coil in the reactor trip switchgear through a handswitch contact in the main control room. For an undervoltage trip path to fail, a perfect short to another power source must occur. For a shunt trip path to fail, the path must open without shorting. It is, therefore, considered incredible that all four paths will fail in the specific manner to disable each respective path, particularly in light of the fact that the trip handswitches in the main control room each utilize all four paths simultaneously when placed in the TRIP position. In addition, the reactor may be tripped locally at the reactor trip switchgear and the motor-generator set supply breaker.. The reactor protection system will not be specifically protected from fire damage. The fail-safe design of the reactor protection system and diversity of input signals which can detect a given event provide additional protection should an event occur before the operator could manually insert the control rods. The input signal cables are run in conduit which makes them less susceptible to fire damage. Fires which occur in the control building which are more threatening to the reactor protection system are fires for which the operator will manually insert the rods quickly to allow evacuation of the main control room.

5.0 IDENTIFICATION OF SAFE SHUTDOWN SYSTEM COMPONENTS

For each system, plant flow diagrams (P&IDs), system descriptions and one-line diagrams were used to identify the precise primary flow paths and operational characteristics that must be established to accomplish the desired safe shutdown function. From this information, a list was compiled in reference 11.2.1 of the components which participate in the system's performance of its safe shutdown function. These components are:

(1) Active components that need to be powered to establish, or assist in establishing, the primary flow path and/or the system's operation.

(2) Active components in the primary flow path that normally are in the proper position whose power loss will not result in a change of position, but may be affected by open, short, or ground faults in control or power cabling.

(3) Power-operated components that need to change position to establish or assist in establishing the primary flow path, whose loss of electrical or air supplies result in the component adopting the required safe shutdown position but which may be affected by open, short or ground faults in control or power cabling.

(4) Major mechanical components that support safe shutdown.

From the analysis of the safe shutdown system flow paths, those components whose spurious operation would threaten safe shutdown system operability were also identified in reference 11.2.1. This identification included those branch flow paths that must be isolated and remain isolated to assure that flow will not be substantially diverted from the primary flow path. See Section 7 for the detailed discussion of spurious operations.

A list was generated for safe shutdown devices including device identification and operating requirements for the various shutdown keys (ref. 11.2.1).

6.0 IDENTIFICATION OF SAFE SHUTDOWN CIRCUITS AND CABLES

The equipment list developed during the SQN safe shutdown system analysis (ref. 11.2.1) was the basic input for the identification of electrical circuits essential to ensure adequate equipment performance. Essential safe shutdown electrical circuits were identified for the electrically-dependent devices (ref. 11.2.2). However, for some equipment, either a subset of cables or no cables were identified. For example, cables were not selected for valves where local manual operation is allowed during cooldown. The circuits identified included power, control, and instrumentation. Type II associated circuits as addressed in Section 7 were also treated as required circuits.

The identification and analysis of these essential electrical circuits was based on one-line diagrams, schematics, and wiring diagrams from which the necessary circuit cables were selected for the subsequent cable routing and separation analysis. Circuit evaluation and identification considers equipment operability requirements. Circuits are identified for active and passive equipment. Circuit identification for high/low pressure boundary components considered the possibility of more conservative cable faults (e.g., 3 phase to 3 phase faults.)

For each electrical component, circuits and cables were identified which (1) are required for safe shutdown to ensure operability or (2) failure of which would be detrimental. The circuits not included per the above criteria included annunciator, computer, motor heaters and external monitoring circuits. Those circuits which are electrically isolated from the electrical circuits of concern, or where failure of these circuits would not affect operability, were not included in the separation analysis.

For each safe shutdown key, cable block diagrams were developed (ref. 11.2.2) for each safe shutdown component to identify cables required to ensure that the component can perform its safe shutdown function. Once the required cables were identified, the cable and conduit schedules were used to identify the individual cable physical routings in the plant on a raceway basis. Field routed conduit was located and evaluated where necessary. Reference 11.2.3 contains the physical routings.

7.0 ASSOCIATED CIRCUITS OF CONCERN

7.1 Introduction

The separation and protection requirements of 10CFR50, Appendix R apply not only to safe shutdown circuits but also to "associated" circuits which could prevent operation or cause maloperation of shutdown systems and equipment. The identification of these associated circuits of concern was performed in accordance with NRC Generic Letter 81-12, the Staff's clarification to Generic Letter 81-12, and Generic Letter 86-10. The generic letters defined associated circuits of concern as those which have a physical separation less than that required by Section III.G of Appendix R, and have one of the following:

Type I — A common power so urce with the shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices;

Type II — A connection to circuits of equipment whose spurious operation would adversely affect the shutdown capability;

Type III — A common enclosure with the shutdown cables, and,

(a) are not electrically protected by circuit breakers, fuses or similar devices, or
(b) will allow propagation of the fire into the common enclosure.

7.2 Associated Circuits by Common Power Supply and Common Enclosures

The electrical distribution system was reviewed to assure that Type I associated circuits by common power supply are addressed by providing selective protective trip coordination for all FSSD power supplies. Type III associated circuits by common enclosures were addressed by ensuring that all existing circuits in Category 1 buildings are electrically protected with a fuse or breaker that will actuate prior to the jacket of existing faulted cables from reaching their auto-ignition temperature.

Electrical circuit fault protection was designed to provide protection for plant electric circuits via protective relaying, circuit breakers and fuses. Protective equipment was designed and applied to ensure adequate protection of electrical distribution equipment, including cables, from electric faults and overload conditions in the circuits. The selection and application of these devices was in accordance with TVA design practices (ref. 11.2.4) and is documented in engineering calculations (ref. 11.2.5). The protective equipment ensures that electrical fault and overloads will not result in any more cable degradation than would be expected when operating conditions are below the set point of the protective equipment. This will also limit cable damage and prevent cable faults from resulting in internal cable temperatures which could cause ignition of cable insulation.

An integral part of the original electric system protection was the proper coordination of these electrical protective devices. Such coordination assures that the protective device nearest (in an electrical sense) to the fault operates prior to the operation of any "upstream" protective devices, and provides interruption of electrical service to a minimum amount of equipment. The electrical protection design (ref. 11.2.4) required coordination of such electrical protective devices and is documented in engineering calculations (ref. 11.2.5).

7.3 Associated Circuits by Spurious Operation

Cables that are and are not part of safe shutdown circuits may be damaged by the effects of postulated fires. This cable damage may consequently prevent the correct operation of safe shutdown components, or result in the maloperation of equipment which would directly prevent the proper performance of the safe shutdown systems. The effects of spurious operations may be conceptually divided into two subclasses as follows:

(1) Maloperation of safe shutdown equipment due to control circuit electrical interlocks between safe shutdown circuits and other circuits; for example, the numerous safe shutdown equipment automatic operation interlocks from process control and instrument circuits.

(2) Maloperation of equipment that is not defined as part of the safe shutdown systems, but that could prevent the accomplishment of a safe shutdown function; for example, inadvertent depressurization of the RCS or the MS system by spurious opening of boundary valves.

The evaluation of Appendix R events ensures that any failure of associated circuits of concern by spurious operation (Type II) will not prevent safe shutdown (refer to Part X). Credible electrical faults considered in the analysis included open circuit, short circuit (conductor-to-conductor), short to ground, and cable-to-cable (hot-short) including 3-phase hot-shorts for high/low pressure interface valves (ref. 11.2.6).

Type II associated circuits of concern outside of containment are analyzed in accordance with Appendix R Sections III.G.2a, III.G.2b, and/or III.G.2c criteria as required circuits. Inside containment, Type II associated circuits of concern are analyzed in accordance with Appendix R Sections III.G.2d, III.G.2e, and/or III.G.2f criteria as required circuits.

In order for cable faults that generate spurious operation to occur, the following conditions must exist synergistically at the cable fault location:

(1) Sufficient energy must exist due to the fire to create failure of the cable jacket and insulating material.

(2) The failure of the jacket and insulating material must occur in a way that directly exposes the cable conductors.

(3) For each short, two or more specific conductors must come into direct contact causing low impedance conductor-to-conductor connections.

(4) For certain types of spurious operation, multiple electrically independent shorts must occur.

(5) No additional conductors that would cause circuit fault currents and operation of circuit protective devices may participate in the short condition.

(6) No ground faults that would cause operation of circuit protective devices must occur.

The spurious operation analysis(ref. 11.2.7) recognized the extremely low probability of certain types of these faulted conditions. The following cable short conditions causing spurious operation were considered of sufficiently low likelihood that they were assumed not to require additional analysis or modification (unless it involves high-low pressure boundary interfaces) :

CASE 1) Three phase-ac power circuit cable-to-cable faults (6.9kV and 480V)

CASE 2) More than one conductor to conductor hot short within one fire affected cable (125VDC/120VAC)

CASE 3) More than one conductor to conductor hot short between cable-to-cable faults (125VDC/120VAC)

With respect to Case 1 no conductor-to-conductor faults within the same power cable can cause spurious powering of the associated device. Only power cable-to-cable connections between one deenergized and one energized power circuit could permit operation. For the case of the three-phase-ac circuit, three electrically independent cable-to-cable shorts must occur without grounds in order to power the associated device. Similarly, with respect to Cases 2 and 3, for the two-wire ungrounded dc or ac power circuit, more than one conductor to conductor selective hot short with the proper polarity without grounds must occur. The likelihood of such occurrences has been acknowledged by the NRC Staff to be sufficiently low to permit excluding such faulted conditions from consideration except for high/low pressure boundary components. Therefore, for the above identified spurious operations caused by cable faults, only 3-phase hot-shorts for high/low pressure boundary interface valves and conductor-to-conductor (same cable), or cable to cable from the same power source have been incorporated into the analysis (ref. 11.2.7).

Concerning Case 1) - The fundamental basis of excluding the remaining shorts from consideration is based on the need for multiple cable-to-cable electrically independent faults in order for spurious operation to occur.

Concerning Case 2), in order for spurious operation to occur due to more than one conductor-to-conductor selective hot short fault within a single cable, proper polarity without grounds must occur

Concerning Case 3), all dc and ac control circuits at SQN are ungrounded. In order for spurious operation to occur due to circuit-to-circuit faults between dc circuits supplied from different sources, at a minimum, two electrically independent cable-to-cable shorts without grounds must occur.

For the ungrounded Motor Control Center (MCC) ac control circuits in Case 3), the identical consideration exists. The MCC transformer secondary 120V ac control circuits are ungrounded. Therefore, at a minimum, two cable-to-cable shorts must simultaneously occur in order for spurious operation to result for circuits supplied from different sources.

7.4 HIGH IMPEDANCE FAULTS

A sustained high impedance fault on a power cable is highly improbable. However, high impedance faults have been considered in the evaluation of the electrical power system's capability to provi de power to the required fire safe shutdown equipment (ref. 11.2.5). To ensure that the upstream breaker supplying a board or distribution panel will not trip as a result of high impedance faults, the following critiar was used:

A. Determine the expected Appendix R board loading.
B. Identify the worst case high impedance fault (that is the non-Appendix R circuit that will be energized and has the largest differential between normal load current and protective device setting/rating). Assume this circuit is subjected to a high impedance fault such that its current rises to just below the trip setpoint of its associated circuit breaker.
C. Verify that the total current from A and B above will not trip the upstream feeder breakers and that there is margin availabe.

8.0 HIGH/LOW PRESSURE BOUNDARY INTERFACES

Special considerations for high/low pressure interfaces to meet the requirements of 10CFR50 Appendix R are described in Generic Letters 81-12 and 86-10 and Information Notice 87-50. Per Generic Letter 81-12, the following information is required for high/low pressure boundary interfaces in order to ensure that they are adequately protected for the effects of a single fire:

1) Identify each high/low pressure interface that uses redundant electrically controlle d devices (such as two series motor operated v alves) to isolate or preclude rupture of any primary coolant boundary.

2) Identify the essential cabling for each device

3) Identify each location where the identified cables are separated by a barrier having less than a 3-hour fire rating

4) For the areas identified in [3] above (if any), provide the bases and justification

Per Generic Letter 86-10, the possibility of getting a hot short on all three phases of three phase ac circuits in the proper sequence to cause spurious operation of a motor is only required to be evaluated for cases involving high/low pressure interfaces. The same applies to ungrounded dc circuits regarding two hot shorts of proper polarity without grounding resulting in spurious operation of high/low pressure interfaces.

Per Information Notice 87-50, for those low pressure systems that connect to the reactor coolant system (a high pressure system) at least one isolation valve must remain closed despite any damage that may be caused by fire, because the high pressure from the reactor coolant system could result in failure of the low pressure piping.

Based on the above, a review of the systems credited for safe shutdown was conducted to identify potential high/low pressure interfaces. These interfaces were evaluated to identify valves that, if spuriously opened, would expose low pressure piping to high pressure resulting in potential failure of the low pressure system. The results are included in Keys 7 and 8 of reference 11.2.1.

The control system for RHR valves has been designed to prohibit opening unless the reactor coolant pressure is low enough to prevent RHR piping failure. However, if these valves opened spuriously, exposure of RHR piping to high pressure may cause failure of the RHR system piping and render the system inoperable. Therefore, the RHR/RCS isolation valves (1-FCV-74-1, 2) are considered high/low pressure interface valves.

Excess letdown is not specifically required for safe shutdown. However, spurious opening of these valves could expose downstream piping to excess pressure that may cause failure resulting in the rupture of the primary coolant boundary. Therefore, the excess letdown isolation valves (1-FCV-62-55, -56) are considered high/low pressure interface valves.

Normal letdown is not specifically required for safe shutdown. However, spurious opening of these valves may cause failure to maintain RCS inventory control. Therefore, the normal letdown isolation valves are considered high/low pressure interface valves.

The pressurizer PORV and reactor head vent isolation valves are designed to function at high RCS operating pressure. They provide two safe shutdown functions: 1) to initially remain closed for RCS inventory control purposes, and; 2) to provide a means of depressurizing the RCS to the point that the RHR system can be initiated to bring the plant to a cold shutdown condition. Discharge from the RCS through these valves is directed to the pressurizer relief tank (PRT). The inlet lines are sized to accommodate vent/relief discharge flow without piping or component failure. Continuous letdown to the PRT may eventually cause spillage of excess coolant to containment through the PRT rupture disks. Therefore, the pressurizer PORVs and block valve combinations, and reactor head vent isolation valves, are required for RCS inventory control (and RCS letdown) and are considered high/low interface valves.

9.0 LOCATION OF SAFE SHUTDOWN EQUIPMENT, CABLES AND RACEWAYS

The safe shutdown equipment list (Table III-2) identifies the equipment, components, and subcomponents relied on for fire safe shutdown (ref. 11.2.1). Safe shutdown cables were identified on block diagrams (ref. 11.2.2). The routing (conduits and tray nodes) of each safe shutdown cable was obtained from the cable and conduit schedules as needed. The route of each safe shutdown cable was plotted on physical drawings and used as part of the separation as needed (ref. 11.2.3).

10.0 SAFE SHUTDOWN SYSTEM SEPARATION EVALUATION METHODOLOGY

10.1 Overview of Evaluation Methodology

The safe shutdown analysis first established the systems, components, and cables required for fire safe shutdown purposes. The locations of equipment and routing of cables were determined as described in previous sections. The separation criteria of Appendix R were evaluated on a fire area basis to meet the safe shutdown performance goals as identified in NRC generic letters and guidance documents.

The Appendix R analysis (refer to Part X) evaluated fire areas that contain systems, components, and cables required for fire safe shutdown. Plant structures that do not contain systems, components, or cables associated with FSSD capabilities were not included in the separation analysis. The adequacy of barriers separating safe shutdown-related buildings was evaluated.

The fire safe shutdown analysis was based on the evaluation of separation in the auxiliary, control, diesel generator, reactor building, and intake pumping station. The auxiliary building, diesel generator buildings, and the intake pumping station, were evaluated against the requirements of Appendix R Sections III.G.1, III.G.2a, III.G.2b, and III.G.2c. For purposes of this analysis, the entire control building was evaluated as a single alternative shutdown location under the criteria of Appendix R Section III.G.3 and III.L. Fire safe shutdown activities take place outside of the control building in the ACR and other manual action locations (ref. 11.2.9). The reactor building was analyzed in accordance with the criteria of Appendix R Sections III.G.2d, III.G.2e, and III.G.2f. Detailed procedures have been developed to ensure fire safe shutdown capability in case of an Appendix R fire (ref. 11.2.10).

Interactions between redundant safe shutdown paths were identified based on the location of the components and cables of redundant safe shutdown paths. Interactions are defined as locations where components of redundant shutdown paths did not meet Appendix R separation criteria. These interactions were evaluated for their impact on the safe shutdown capability of the plant and the resolutions have been implemented. The resolutions may consist of modifications, use of radiant energy shielding, fire detection and suppression in the area, alternate equipment, manual operator actions, fire barrier installation, pre-fire actions, post-fire repairs (ref. 11.2.11), engineering evaluations prepared in accordance with the guidance of Generic Letter 86-10, or deviation requests (refer to Part VIII).

10.2 Fire Area Evaluation Methodology

Separation analyses were initially evaluated for viability on a fire area basis. The fire area separation analysis was effective where only a single room constituted a fire area, and where redundant capability existed outside of the fire area. Large rooms and specific fire areas containing redundant trains of safe shutdown systems, components, or cables were further evaluated for purposes of separation. Where multiple rooms exist in the fire area, regulatory barriers with a 1-1/2-hour fire rating have been credited under Appendix R Section III.G.2c criteria. Where the 1-1/2-hour fire rated barriers have been credited, automatic detection and suppression capabilities on both sides of the barriers have been evaluated per Section III.G.2c criteria.

Credit has been taken for a minimum of 20 feet of separation under Appendix R Section III.G.2b criteria in those fire areas that contain multiple rooms not separated by regulatory fire barriers. Section III.G.2b criteria has also been utilized in large rooms that contain redundant trains of safe shutdown capability. Section III.G.2c criteria has been applied where 20 feet of separation was not available. Section III.G.2b criteria has been used in the large open areas of the auxiliary building and adjacent rooms which are not enclosed by regulatory fire barriers.

The fire area analysis is documented in Part X with deviations and evaluations documented in Part VII.

11.0 REFERENCES

11.1 Regulatory Documents

11.1.1 10CFR50 Appendix R

11.1.2 Generic Letter 81-12, Enclosure 1

11.2 TVA Documents

11.2.1 SQN-SQS4-0127, "Equipment Required for Safe Shutdown per 10CFR50 Appendix R"

11.2.2 Electrical Equipment Block Diagrams Calculation Series, BD-K1 through B-K48

11.2.3 TVA Drawing 45E890 Series

11.2.4 Electrical Design Criteria: SQN-DC-V-10.7, SQN-DC-V-11.2, SQN-DC-V-11.2.2, SQN-DC-V-11.4.1, SQN-DC-V-11.6, SQN-DC-V-11.6.1

11.2.5 Calculations: D2SDJ-P213350SQN-APPR-1,SQN-APPR-2, SQN-APS-003, SQN-APS-015, SQN-CPS-051

11.2.6 SQN Detailed Design Criteria, SQN-DC-V-10.7, "10CFR50, Appendix R, Typd, II, & III Items"

11.2.7 Calculations: SQN-APPR-10,SQN-CSS-023, SQN-CSS-024

11.2.8 SQN-DC-V-24.0, "Design Criteria for Fire Protection of Safe Shutdown Capability"

11.2.9 AOP-C.04, "Control Room Inaccessibility"

11.2.10 AOP-N-01, "Plant Fires"

11.2.11 SMI-0-317-8, "Appendix R-Casualty Procedures"

11.2.12 DCN D20071A/P20872A " Vital Inverter Modification"

Key 1	Centrifugal Charging Pump and Component Cooling System
Key 2	Charging Flow Control Path
Key 3	Emergency Raw Cooling Water Path
Key 4	Volume Control Tank Suction
Key 5	RWST Suction
Key 6	ECCS Charging Path
Key 7	RCS Pressure Boundary Isolation
Key 8	Reactor Coolant Pressure Boundary Isolation Excess Letdown Isolation
Key 9	RCP Thermal Barrier Cooling
Key 11	Motor Driven Auxiliary Feedwater Pumps
Key 12	Steam Generator Level Control Using MDAFW Pump
Key 13	Control Air
Key 14 & 15	Turbine-Driven Auxiliary Feedwater Pump
Key 16	Steam Generator Level Control using TDAFW Pump
Key 17	Suction From Condensate Storage Tank
Key 19	Suction from ERCW To AFW Pump Suction
Key 20	Main Steam Isolation
Key 21	Steam Load Isolation
Key 22	Feedwater Isolation
Key 23	Feedwater Pump Turbine
Key 24	Steam Generator Blowdown Isolation
Key 25	Secondary Safety Valves
Key 26	Secondary Relief Valves
Key 28	RCS Pressure Control
Key 29	Reactor Trip
Key 30	RHR Shutdown Cooling Flow Paths
Key 31	RHR Pumps Key
Key 34	Normal Charging Path
Key 36	Accumulator Isolation
Key 37A	Main Control Room HVAC
Key 37B	Auxiliary Inst Rm HVAC
Key 37C	Diesel Generator Building HVAC
Key 37F	480V Bd Rm & BatteryRm HVAC
Key 37K	480V Transformer Rooms HVAC
Key 37P	CCS/SFP HVAC
Key 37N	TDAFW PUMP ROOM HVAC
Key 37O	CCS/AFW Pump Coolers and AFW/BAT Pump Coolers
Key 38/39	Electrical Power (includes Onsite and Offsite and Distribution)
Key 40	RHR Pump Rm Coolers
Key 41	Operator Integrity (communications/lighting/access)
Key 48	RCS Letdown

Shutdown Logic Component List
Main Steam (1)

Component	Key	Reference Drawing	Description
1&2-P-1-2A	26,SI	47W610-1-1	Loop 1 Main Steam Pressure Indication Instrumentation loop
1&2-P-1-2B	26,SI	47W610-1-1	Loop 1 Main Steam Pressure Indication Instrumentation loop
1&2-P-1-2D	26	47W610-1-1	Loop 1 Main Steam Pressure Indication Instrumentation loop
1&2-FCV-1-4	20	47W801-1	Loop 1 MSIV
1&2-FSV-1-4A	20	47W610-1-1	Loop 1 MSIV Air Supply Solenoid
1&2-FSV-1-4B	20	47W610-1-1	Loop 1 MSIV Air Supply Solenoid
1&2-FSV-1-4D	20	47W610-1-1	Loop 1 MSIV Air Vent Solenoid
1&2-FSV-1-4E	20	47W610-1-1	Loop 1 MSIV Air Vent Solenoid
1&2-FSV-1-4F	20	47W610-1-1	Loop 1 MSIV Test Solenoid
1&2-FSV-1-4G	20	47W610-1-1	Loop 1 MSIV Air Vent Solenoid
1&2-FSV-1-4H	20	47W610-1-1	Loop 1 MSIV Air Vent Solenoid
1&2-FSV-1-4J	20	47W610-1-1	Loop 1 MSIV Test Solenoid
1&2-P-1-5	26,SI	47W610-1-1	Loop 1 Atmospheric Relief Valve Control Instrument loop
1&2-PCV-1-5	26	47W801-1	Loop 1 Atmospheric Relief Valve
1&2-FCV-1-7	24	47W801-2	Steam Generator 1 Blowdown Isolation Valve
1&2-P-1-9A	26,SI	47W610-1-1	Loop 2 Main Steam Pressure Indication Instrumentation Loop
1&2-P-1-9B	26,SI	47W610-1-1	Loop 2 Main Steam Pressure - Indication Instrumentation Loop
1&2-P-1-9D	26	47W610-1-1	Loop 2 Main Steam Pressure - Indication Instrumentation Loop
1&2-FCV-1-11	20	47W801-1	Loop 2 MSIV
1&2-FSV-1-11A	20	47W610-1-1	Loop 2 MSIV Air Supply Solenoid
1&2-FSV-1-11B	20	47W610-1-1	Loop 2 MSIV Air Supply Solenoid
1&2-FSV-1-11D	20	47W610-1-1	Loop 2 MSIV Air Vent Solenoid
1&2-FSV-1-11E	20	47W610-1-1	Loop 2 MSIV Air Vent Solenoid
1&2-FSV-1-11F	20	47W610-1-1	Loop 2 MSIV Test Solenoid
1&2-FSV-1-11G	20	47W610-1-1	Loop 2 MSIV Air Vent Solenoid
1&2-FSV-1-11H	20	47W610-1-1	Loop 2 MSIV Air Vent Solenoid
1&2-FSV-1-11J	20	47W610-1-1	Loop 2 MSIV Test Solenoid
1&2-P-1-12	26,SI	47W610-1-1	Loop 2 Atmospheric Relief Valve Control Instrumentation Loop
1&2-PCV-1-12	26	47W801-1	Loop 2 Atmospheric Relief Valve Control
1&2-FCV-1-14	24	47W801-2	SG 2 Blowdown Isolation Valve

Shutdown Logic Component List
Main Steam (1) (Continued)

Component	Key	Reference Drawing	Description
1&2-FCV-1-15	14,15	47W803-2	AFPT Steam Supply from SG No. 1
1&2-FCV-1-16	14,15	47W803-2	AFPT Steam Supply from SG No. 4
1&2-FCV-1-17	14,15	47W803-2	Steam Flow Isolation to AFPT
1&2-FCV-1-18	14,15	47W803-2	Steam Flow Isolation to AFPT
1&2-P-1-20A	26, SI	47W610-1-2	Loop 3 Main Steam Pressure Indication Instrumentation Loop
1&2-P-1-20B	26,SI	47W610-1-2	Loop 3 Main Steam Pressure Indication Instrumentation Loop
1&2-P-1-20D	26	47W610-1-2	Loop 3 Main Steam Pressure Indication Instrumentation Loop
1&2-FCV-1-22	20	47W801-1	Loop 3 MSIV
1&2-FSV-1-22A	20	47W610-1-2	Loop 3 MSIV Air Supply Solenoid
1&2-FSV-1-22B	20	47W610-1-2	Loop 3 MSIV Air Supply Solenoid
1&2-FSV-1-22D	20	47W610-1-2	Loop 3 MSIV Air Vent Solenoid
1&2-FSV-1-22E	20	47W610-1-2	Loop 3 MSIV Air Vent Solenoid
1&2-FSV-1-22F	20	47W610-1-2	Loop 3 MSIV Test Solenoid
1&2-FSV-1-22G	20	47W610-1-2	Loop 3 MSIV Air Vent Solenoid
1&2-FSV-1-22H	20	47W610-1-2	Loop 3 MSIV Air Vent Solenoid
1&2-FSV-1-22J	20	47W610-1-2	Loop 3 MSIV Test Solenoid
1&2-P-1-23	26,SI	47W610-1-2	Loop 3 Main Steam Pressure Indication Instrumentation Loop
1&2-PCV-1-23	26	47W801-1	Loop 3 Atmospheric Relief Valve
1&2-FCV-1-25	24	47W801-2	Steam Generator 3 Blowdown Isolation Valve
1&2-P-1-27A	26,SI	47W610-1-2	Loop 4 Main Steam Pressure Indication Instrumentation Loop
1&2-P-1-27B	26,SI	47W610-1-2	Loop 4 Main Steam Pressure Indication Instrumentation Loop
1&2-P-1-27D	26	47W610-1-2	Loop 4 Main Steam Pressure Indication Instrumentation Loop
1&2-FCV-1-29	20	47W801-1	Loop 4 MSIV
1&2-FSV-1-29A	20	47W610-1-2	Loop 4 MSIV Air Supply Solenoid
1&2-FSV-1-29B	20	47W610-1-2	Loop 4 MSIV Air Supply Solenoid
1&2-FSV-1-29D	20	47W610-1-2	Loop 4 MSIV Air Vent Solenoid
1&2-FSV-1-29E	20	47W610-1-2	Loop 4 MSIV Air Vent Solenoid
1&2-FSV-1-29F	20	47W610-1-2	Loop 4 MSIV Test Solenoid
1&2-FSV-1-29G	20	47W610-1-2	Loop 4 MSIV Air Vent Solenoid
1&2-FSV-1-29H	20	47W610-1-2	Loop 4 MSIV Air Vent Solenoid
1&2-FSV-1-29J	20	47W610-1-2	Loop 4 MSIV Test Solenoid

APPENDIX C

Shutdown Logic Component List
Main Steam (1) (Continued)

Component	Key	Reference Drawing	Description
1&2-P-1-30	26,SI	47W610-1-2	Loop 4 Main Steam Pressure Indication Instrumentation Loop
1&2-PCV-1-30	26	47W801-1	Loop 4 Atmospheric Relief Valve
1&2-FCV-1-32	24	47W801-2	SG 4 Blowdown Isolation Valve
1&2-FCV-1-36	21,23	47W801-1	High Pressure Stop Valve to MFPT A
1&2-FCV-1-37	21,23	47W801-1	High Pressure Control Valve to MFPT A
1&2-FCV-1-38	23	47W801-1	Low Pressure Control Valve to MFPT A
1&2-FCV-1-39	23	47W801-1	Low Pressure Stop Valve to MFPT A
1&2-FCV-1-43	21,23	47W801-1	High Pressure Stop Valve to MFPT B
1&2-FCV-1-44	21,23	47W801-1	High Pressure Control Valve to MFPT B
1&2-FCV-1-45	23	47W801-1	Low Pressure Control Valve to MFPT B
1&2-FCV-1-46	23	47W801-l	Low Pressure Stop Valve to MFPT B
1&2-FCV-1-51	14,15	47W803-2	AFPT Trip & Throttle Valve
1&2-FCV-1-52	14,15	47W610-1-1	AFPT Governor Valve
1&2-FCV-1-61	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-62	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-64	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-65	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-67	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-68	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-70	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-71	21	47W801-1	Main Steam Stop and Control Valve to High Pressure Turbine
1&2-FCV-1-75	21	47W801-1	Main Steam to MSR A2
1&2-FCV-1-77	21	47W801-1	Main Steam to MSR B2
1&2-FCV-1-79	21	47W801-1	Main Steam to MSR C2
1&2-FCV-1-84	21	47W801-1	Main Steam to MSR A1
1&2-FCV-1-91	21	47W801-1	Main Steam to MSR B1
1&2-FCV-1-98	21	47W801-1	Main Steam to MSR C1

APPENDIX C

Shutdown Logic Component List
Main Steam (1) (Continued)

Component	Key	Reference Drawing	Description
1&2-FCV-1-103	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-104	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-105	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-106	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-107	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-108	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-109	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-110	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-111	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-112	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-113	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-114	21	47W801-1	Main Steam Dump Valve
1&2-FCV-1-147	20	47W801-1	MSIV Bypass Valve
1&2-FCV-1-148	20	47W801-1	MSIV Bypass Valve
1&2-FCV-1-149	20	47W801-1	MSIV Bypass Valve
1&2-FCV-1-150	20	47W801-1	MSIV Bypass Valve
1&2-FCV-1-181	24	47W801-2	SG 1 Blowdown Containment Isolation Valve
1&2-FCV-1-182	24	47W801-2	SG 2 Blowdown Containment Isolation Valve
1&2-FCV-1-183	24	47W801-2	SG 3 Blowdown Containment Isolation Valve
1&2-FCV-1-184	24	47W801-2	SG 4 Blowdown Containment Isolation Valve
1&2-FCV-1-275	21	47W801-1	MSR A2 Low Power Bypass Valve
1&2-FCV-1-277	21	47W801-1	MSR B2 Low Power Bypass Valve
1&2-FCV-1-279	21	47W801-1	MSR C2 Low Power Bypass Valve
1&2-FCV-1-284	21	47W801-1	MSR A1 Low Power Bypass Valve
1&2-FCV-1-291	21	47W801-1	MSR B1 Low Power Bypass Valve
1&2-FCV-1-298	21	47W801-1	MSR C1 Low Power Bypass Valve
1&2-VLV-1-512	25	47W801-1	Main Steam Safety Valve from SG 3
1&2-VLV-1-513	25	47W801-1	Main Steam Safety Valve from SG 3
1&2-VLV-1-514	25	47W801-1	Main Steam Safety Valve from SG 3
1&2-VLV-1-515	25	47W801-1	Main Steam Safety Valve from SG 3
1&2-VLV-1-516	25	47W801-1	Main Steam Safety Valve from SG 3
1&2-VLV-1-517	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-518	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-519	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-520	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-521	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-517	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-518	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-519	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-520	25	47W801-1	Main Steam Safety Valve from SG 2
1&2-VLV-1-521	25	47W801-1	Main Steam Safety Valve from SG 2

APPENDIX C

Main Steam (1) (Continued)

Component	Key	Reference Drawing	Description
1&2-VLV-1-522	25	47W801-1	Main Steam Safety Valve from SG 1
1&2-VLV-1-523	25	47W801-1	Main Steam Safety Valve from SG 1
1&2-VLV-1-524	25	47W801-1	Main Steam Safety Valve from SG 1
1&2-VLV-1-525	25	47W801-1	Main Steam Safety Valve from SG 1
1&2-VLV-1-526	25	47W801-1	Main Steam Safety Valve from SG 1
1&2-VLV-1-527	25	47W801-1	Main Steam Safety Valve from SG 4
1&2-VLV-1-528	25	47W801-l	Main Steam Safety Valve from SG 4
1&2-VLV-1-529	25	47W801-1	Main Steam Safety Valve from SG 4
1&2-VLV-1-530	25	47W801-1	Main Steam Safety Valve from SG 4
1&2-VLV-1-531	25	47W801-1	Main Steam Safety Valve from SG 4
1&2-VLV-1-868	24	47W801-2	SG Blowdown Heat Exchanger Isolation Valve
1&2-VLV-1-869	24	47W801-2	SG Blowdown Heat Exchanger Isolation Valve

Main & Auxiliary Feedwater (3)

Component	Key	Reference Drawing	Description
1&2-PMP-3-118	11	47W803-2	Motor Driven Auxiliary Feedwater Pump A-A
1&2-PMP-3-128	11	47W803-2	Motor Driven Auxiliary Feedwater Pump B-B
1&2-PMP-3-142	14&15	47W803-2	Turbine Driven Auxiliary Feedwater Pump A-S
1&2-FCV-3-33	22	47W803-1	SG 1 Main Feedwater Isolation Valve
1&2-FCV-3-35	22	47W803-1	SG 1 Main Feedwater Control Valve
1&2-FCV-3-35A	22	47W610-3-1	Feedwater Low Load Bypass to SG 1
1&2-L-3-39	12,16	47W610-3-1	SG 1 NR Level Instrumentation Loop
1&2-L-3-43	12,16	47W610-3-1	SG 1 WR Level Instrumentation Loop
1&2-FCV-3-47	22	47W803-1	SG 2 MFW Isolation Valve
1&2-FCV-3-48	22	47W803-1	SG 2 MFW Control Valve
1&2-FCV-3-48A	22	47W610-3-1	Feedwater Low Load Bypass to SG 2
1&2-L-3-52	12,16	47W610-3-1	SG 2 NR Level Instrumentation Loop
1&2-L-3-56	12,16	47W610-3-1	SG 2 WR Level Instrumentation Loop
1&2-FCV-3-87	22	47W803-1	SG 3 MFW Isolation Valve
1&2-FCV-3-90	22	47W803-1	SG 3 MFW Control Valve
1&2-FCV-3-90A	22	47W610-3-2	Feedwater Low Load Bypass to SG 3
1&2-L-3-93	12	47W610-3-2	SG 3 NR Level Instrumentation Loop
1&2-L-3-94	12,16	47W610-3-2	SG 3 NR Level Instrumentation Loop
1&2-L-3-98	12,16	47W610-3-2	SG 3 WR Level Instrumentation Loop
1&2-FCV-3-103A	22	47W610-3-2	Feedwater Low Load Bypass to SG 4
1&2-L-3-106	12	47W610-3-2	SG 4 NR Level Instrumentation Loop
1&2-L-3-107	12,16	47W610-3-2	SG 4 NR Level Instrumentation Loop

Main & Auxiliary Feedwater (3) (continued)

Component	Key	Reference Drawing	Description
1&2-FCV-3-100	22	47W803-1	SG 4 MFW Isolation Valve
1&2-FCV-3-103	22	47W803-1	SG 4 MFW Isolation Valve
1&2-L-3-111	12,16	47W610-3-2	SG 4 WR Level Instrumentation Loop
1&2-FCV-3-116A	19	47W803-2	ERCW Header A Isolation Valve
1&2-FCV-3-116B	19	47W803-2	ERCW Header A Isolation Valve
1&2-FCV-3-126A	19	47W803-2	ERCW Header B IsolationValve
1&2-FCV-3-126B	19	47W803-2	ERCW Header B Isolation Valve
1&2-FCV-3-136A	19	47W803-2	ERCW Header A Isolation Valve
1&2-FCV-3-136B	19	47W803-2	ERCW Header A Isolation Valve
1&2-P-3-138A	14,15	47W610-3-3	Turbine Driven AFW Pump Outlet Pressure Instrumentation Loop
1&2-F-3-142	14,15	47W610-3-3	TDAFWP Flow Instrumentation Loop
1&2-L-3-148	12	47W610-3-3	SG 3 Level Instrumentation Loop
1&2-LSV-3-148	12	47W610-3-3	Solenoid for Loop 3 MDAF WP Level Control Valve
1&2-LCV-3-148	12	47W610-3-3	SG 3 MDAF WP Level Control Valve
1&2-P-3-148	12	47W610-3-3	SG 3 Level Bypass Pressure Switch Instrumentation Loop
1&2-L-3-156	12	47W610-3-3	SG 2 Level Instrumentation Loop
1&2-LCV-3-156	12	47W610-3-3	SG 2 MDAFWP Level Control Valve
1&2-LSV-3-156	12	47W610-3-3	Solenoid for Loop 2 MDAFWP Level Control Valve
1&2-P-3-156	12	47W610-3-3	SG 2 Level Bypass Switch Instrumentation Loop
1&2-L-3-164	12	47W610-3-3	SG 1 Level instrumentation Loop
1&2-LSV-3-164	12	47W610-3-3	Solenoid for Loop 1 MDAF WP Level Control Valve
1&2-LCV-3-164	12	47W610-3-3	SG 1 MDAF WP Level Control Valve
1&2-P-3-164	12	47W610-3-3	SG 1 Level Bypass Pressure Switch Instrumentation Loop
1&2-L-3-171	12	47W610-3-3	SG 4 Level Instrumentation Loop
1&2-LCV-3-171	12	47W610-3-3	SG 4 MDAF WP Level Control Valve
1&2-LSV-3-171	12	47W610-3-3	Solenoid for Loop 4 MDAF WP Level Control Valve
1&2-P-3-171	12	47W610-3-3	SG 4 Level Bypass Pressure Switch Instrumentation Loop
1&2-L-3-172	16	47W610-3-3	SG 3 Level Instrumentation Loop
1&2-LCV-3-172	16	47W610-3-3	SG 3 TDAF WP Level Control Valve
1&2-LSV-3-172	16	47W610-3-3	Solenoid for Loop 3 TDAF WP Feed Reg Valve

PS-3-140A, -140B, -150B, -160A, and -160B have been deleted by ECN-L5883

Main & Auxiliary Feedwater (3) (Continued)

Component	Key	Reference Drawing	Description
1&2-L-3-173	16	47W610-3-3	SG 2 Level Instrumentation Loop
1&2-LCV-3-173	16	47W610-3-3	SG 2 TDAF WP Level Control Valve
1&2-LSV-3-173	16	47W610-3-3	Solenoid for Loop 2 TDAF WP Level Control Valve
1&2-L-3-174	16	47W610-3-3	SG 1 Level Instrumentation Loop
1&2-LSV-3-174	16	47W610-3-3	Solenoid for Loop 1 TDAF WP Level Control Valve
1&2-LCV-3-174	16	47W610-3-3	SG 1 TDAF WP Level Control Valve
1&2-L-3-175	16	47W610-3-3	SG 4 Level Control Instrumentation Loop
1&2-LCV-3-175	16	47W610-3-3	SG 4 TDAF WP Level Control Valve
1&2-LSV-3-175	16	47W610-3-3	Solenoid for Loop 4 TDAF WP Level Control Valve
1&2-FCV-3-179A	19	47W610-3-3	ERCW Header B Isolation Valve
1&2-FCV-3-179B	19	47W610-3-3	ERCW Header B Isolation Valve
1&2-FCV-3-400	12	47W803-2	Air operated Auxiliary Feedwater Pump A-A Recirculation valve
1&2-FCV-3-401	12	47W803-2	Air operated Auxiliary Feedwater Pump B-B Recirculation valve
1&2-VLV-3-826	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump B-B to SG 3
1&2-VLV-3-827	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump A-A to SG 2
1&2-VLV-3-828	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump A-A to SG 1
1&2-VLV-3-829	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump B-B to SG 4
1&2-VLV-3-834	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump B-B to SG 3
1&2-VLV-3-835	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump A-A to SG 2
1&2-VLV-3-836	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump 1A-A to SG 1
1&2-VLV-3-837	12	47W803-2	Manual Isolation of Auxiliary Feedwater Pump 1B-B to SG 4
1&2-VLV-3-867	16	47W803-2	TDAFW Pump Discharge Isolation Valve for SG 3
1&2-VLV-3-868	16	47W803-2	TDAFW Pump Discharge Isolation Valve for SG 2
1&2-VLV-3-877	16	47W803-2	TDAFW Pump Discharge Isolation Valve for SG 1
1&2-VLV-3-878	16	47W803-2	TDAFW Pump Discharge Isolation Valve for SG 4

PS-3-165A and -165B have been deleted by ECN-L5883.

Ventilation (30)

Component	Key	Reference Drawing	Description
1&2-P-30-42	SI	47W866-1	Containment Pressure Instrument Loop
1&2-P-30-43	SI	47W866-1	Containment Pressure Instrument Loop
1&2-P-30-44	SI	47W866-1	Containment Pressure Instrument Loop
1&2-T-30-175	40	47W866-8	RHR Pump Room Coolers Temperature Switch Instrumentation Loop
1&2-T-30-176	40	47W866-8	RHR Pump Room Coolers Temperature Switch Instrumentation Loop
1&2-CLR-30-182	37R	47W866-8	CCP Rm Clr Fan B-B
1&2-CLR-30-183	37R	47W866-8	CCP Rm Clr Fan A-A
1&2-T-30-182	37R	47W866-8	CCP Rm Clr Temp Control Instrumentation Loop
1&2-T-30-183	37R	47W866-8	CCP Rm Clr Temp Control Instrumentation Loop
2-CLR-30-184	37O	47W866-8	AFW & Boric Acid Xfer Pump Rm Clr A
2-CLR-30-185	37O	47W866-8	AFW & Boric Acid Xfer Pump Rm Clr B
1-CLR-30-190	37O	47W866-8	CCS & AFW Room Clr A
1-CLR-30-191	37O	47W866-8	CCS & AFW Room Clr B
1&2-TS-30-214	37N, 14, 15	47W610-30-6	Turbine Driven Auxiliary Feedwater Pump Room Vent Fan Temp Switch
1,2-HS-30-214	37N	47W610-30-6	Turbine Driven Auxiliary Feedwater Pump Room Vent Fan Handswitch
1-FAN-030-244A-A	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-244B-A	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-244D-A	37K	47866-3	480V Transformer Room Cooling
2-FAN-030-246A-B	37K	47866-3	480V Transformer Room Cooling
2-FAN-030-246B-B	37K	47866-3	480V Transformer Room Cooling
2-FAN-030-246D-B	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-248A-B	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-248B-B	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-248D-B	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-250A-A	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-250B-A	37K	47866-3	480V Transformer Room Cooling
1-FAN-030-250D-A	37K	47866-3	480V Transformer Room Cooling
1-FCO-30-443	37C	47W866-9	DG Building Intake Damper
2-FCO-30-444	37C	47W866-9	DG Building Intake Damper
1-FCO-30-445	37C	47W866-9	DG Building Intake Damper
2-FCO-30-446	37C	47W866-9	DC Building Intake Damper
1-FCO-30-447	37C	47W866-9	DG Building Exhaust Damper
1-HS-30-447B	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-TS-30-447B	37C	47W866-9	DG Building Exhaust Temperature Switch
1-HS-30-447C	37C	47W866-9	DG Building Exhaust Fan Handswitch

Ventilation (30) (Continued)

Component	Key	Reference Drawing	Description
2-FCO-30-448	37C	47W866-9	DG Building Exhaust Damper
2-TS-30-448B	37C	47W866-9	DG Building Exhaust Temperature Switch
2-HS-30-448B	37C	47W866-9	DG Building Exhaust Fan Handswitch
2-HS-30-448C	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-FCO-30-449	37C	47W866-9	DG Building Exhaust Damper
2-TS-30-449B	37C	47W866-9	DG Building Exhaust Temperature Switch
1-HS-30-449B	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-HS-30-449C	37C	47W866-9	DG Building Exhaust Fan Handswitch
2-FCO-30-450	37C	47W866-9	DG Building Exhaust Damper
2-HS-30-450B	37C	47W866-9	DG Building Exhaust Fan Handswitch
2-HS-30-450C	37C	47W866-9	DC Building Exhaust Fan Handswitch
2-TS-30-450B	37C	47W866-9	DG Building Exhaust Temperature Switch
1-FCO-30-451	37C	47W866-9	DC Building Exhaust Damper
1-TS-30-451B	37C	47W866-9	DC Building Exhaust Temperature Switch
1-HS-30-451B	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-HS-30-451C	37C	47W866-9	DC Building Exhaust Fan Handswitch
2-TS-30-452B	37C	47W866-9	DG Building Exhaust Temperature Switch
2-FCO-30-452	37C	47W866-9	DG Building Exhaust Damper
2-HS-30-452B	37C	47W866-9	DG Building Exhaust Fan Handswitch
2-HS-30-452C	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-FCO-30-453	37C	47W866-9	DG Building Exhaust Damper
1-TS-30-453B	37C	47W866-9	DG Building Exhaust Temperature Switch
1-HS-30-453B	37C	47W866-9	DG Building Exhaust Temperature Fan Handswitch
1-HS-30-453C	37C	47W866-9	DG Building Exhaust Temperature Fan Handswitch
2-FCO-30-454	37C	47W866-9	DG Building Exhaust Damper Switch
2-HS-30-454B	37C	47W866-9	DG Building Exhaust Fan Handswitch
2-TS-30-454B	37C	47W866-9	DG Building Exhaust Temperature Switch
2-HS-30-454C	37C	47W866-9	DG Building Exhaust Fan Handswitch
1-FCO-30-459	37C	47W866-9	DG Electric Board Room Exhaust Damper
1-HS-30-459B	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
1-HS-30-459C	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
2-FCO-30-460	37C	47W866-9	DG Electric Board Room Exhaust Damper
2-HS-30-460B	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
2-HS-30-460C	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch

APPENDIX C

Ventilation (30) (Continued)

Component	Key	Reference Drawing	Description
1-FCO-30-461	37C	47W866-9	DG Electric Board Room Exhaust Damper
1-HS-30-461B	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
1-HS-30-461C	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
2-FCO-30-462	37C	47W866-9	DG Electric Board Room Exhaust Damper
2-HS-30-462B	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
2-HS-30-462C	37C	47W866-9	DG Electric Board Room Exhaust Fan Handswitch
1-FAN-30-459	37C	47W866-9	E;ec Bd Room 1A-A Elec. Panel/Gen. Fan
2-FAN-30-460	37C	47W866-9	E;ec Bd Room 2A-A Elec. Panel/Gen. Fan
1-FAN-30-461	37C	47W866-9	E;ec Bd Room 1B-B Elec. Panel/Gen. Fan
1-FAN-30-462	37C	47W866-9	E;ec Bd Room 2B-B Elec. Panel/Gen. Fan
1-FAN-30-447	37C	47W866-9	DG Room 1A-A Exhaust Fan 1
2-FAN-30-448	37C	47W866-9	DG Room 2A-A Exhaust Fan 1
1-FAN-30-449	37C	47W866-9	DG Room 1B-B Exhaust Fan 1
2-FAN-30-450	37C	47W866-9	DG Room 2B-B Exhaust Fan 1
1-FAN-30-451	37C	47W866-9	DG Room 1A-A Exhaust Fan 2
2-FAN-30-452	37C	47W866-9	DG Room 2A-A Exhaust Fan 2
1-FAN-30-453	37C	47W866-9	DG Room 1B-B Exhaust Fan 2
2-FAN-30-454	37C	47W866-9	DG Room 2B-B Exhaust Fan 2
1-FAN-30-459	37C	47W866-9	DG Electric Board Room 1A-A Exhaust
2-FAN-30-460	37C	47W866-9	DG Electric Board Room 2A-A Exhaust
1-FAN-30-461	37C	47W866-9	DG Electric Board Room 1B-B Exhaust
2-FAN-30-462	37C	47W866-9	DG Electric Board Room 2B-B Exhaust
1&2-FAN-30-214	14/15, 37N	47W866-11	DC Powered TDAFW Pump Room Fan
1-CLR-30-175	40	47W866-8	RHR Pump 1A Cooling Fan
1-CLR-30-176	40	47W866-8	RHR Pump 1B Cooling Fan
2-CLR-30-175	40	47W866-8	RHR Pump 2A Cooling Fan
2-CLR-30-176	40	47W866-8	RHR Pump 2B Cooling Fan
1&2-CLR-30-183	1,37R	47W866-8 47W610-30-5	1&2 CCP Room Cooler Fan A-A
1&2-CLR-30-182	1,37R	47W866-8 47W610-30-5	1&2 CCP Room Cooler Fan B-B

A/C (Cooling & Heating) (31)

Component	Key	Reference Drawing	Description
0-HS-31A-20A	37A	47W867-2	MCR Air Handling Unit Handswitch
0-HS-31A-20B	37A	47W867-2	MCR Air Handling Unit Handswitch
0-FCO-31A-20	37A	47W867-2	MCR Air Handling Unit Inlet Damper
0-FSV-31A-20	37A	47W867-2	MCR Air Handling Unit Solenoid Valve
0-T-31A-22	37A	47W867-2	MCR AHU Temperature Control Instrumentation Loop
0-FSV-31A-22A	37A	47W867-2	MCR AHU Cooling Fluid Solenoid Valve
0-FSV-31A-22B	37A	47W867-2	MCR AHU Cooling Fluid Solenoid Valve
0-FCO-31A-23	37A	47W867-2	MCR AHU Inlet Damper
0-FSV-31A-23	37A	47W867-2	MCR AHU Solenoid Valve
0-HS-31A-23A	37A	47W867-2	MCR Air Handling Unit Handswitch
0-HS-31A-23B	37A	47W867-2	MCR Air Handling Unit Handswitch
0-T-31A-39	37A	47W867-2	MCR AHU Temperature Control Instrumentation Loop
0-FSV-31A-39A	37A	47W867-2	MCR AHU Cooling Fluid Solenoid Valve
0-FSV-31A-39B	37A	47W867-2	MCR AHU Cooling Fluid Solenoid Valve
0-TCV-31A-47 & Loop	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-48 "	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-49 "	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-50 "	37A	47W867-2	MCR AHU Cooling Fluid Control
0-T-31A-52	37A	47W867-2	MCR AHU Air Controls Instrument Loop
0-TCV-31A-65 & Loop	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-66 & Loop	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-67 & Loop	37A	47W867-2	MCR AHU Cooling Fluid Control
0-TCV-31A-68 & Loop	37A	47W867-2	MCR AHU Cooling Fluid Control
0-T-31A-70	37A	47W867-2	MCR AHU Air Control Instrument Loop
0-P-31A-126	37A	47W867-4	MCR AHU Condensing Unit Pressure Control Instrumentation Loop
0-P-31A-127	37A	47W867-4	MCR AHU Condensing Unit Pressure Control Instrumentation Loop
0-T-31A-128	37A	47W867-4	MCR AHU Condensing Unit Temperature Control Instrumentation Loop
0-T-31A-129	37A	47W867-4	MCR AHU Condensing Unit Temperature Control Instrumentation Loop
0-LG-31A-130	37A	47W867-4	MCR AHU Condensing Unit Oil Sump Level Glass
0-LOOP-31A-131	37A	47W867-4	MCR AHU Condensing Unit A-A
0-T-31A-132	37A	47W867-4	MCR AHU Condensing Unit Oil Pump Motor Temperature Instrumentation Loop
0-T-31A-133	37A	47W867-4	Oil Cooler MCR AHU Condensing Unit Control Instrumentation Loop

A/C (Cooling & Heating) (31) (Continued)

Component	Key	Reference Drawing	Description
0-LOOP-31A-134	37A	47W867-4	MCR AHU Condensing Unit A-A
0-ET-31A-136	37A	47W867-4	MCR AHU Condensing Unit A-A Comp. Motor Overload Transmitter
0-P-31A-141	37A	47W867-4	MCR AHU Condensing Unit Liquid Pressure Instrumentation Loop
0-P-31A-142	37A	47W867-4	MCR AHU Condensing Unit Liquid Pressure Instrumentation Loop
0-T-31A-143	37A	47W867-4	MCR AHU Condensing Unit Temperature Controls Instrumentation Loop
0-T-31A-144	37A	47W867-4	MCR AHU Condensing Unit Temperature Controls Instrumentation Loop
0-LG-31A-145	37A	47W867-4	MCR AHU Condensing Unit Oil Sump Level Glass
0-LOOP-31A-146	37A	47W867-4	MCR AHU Condensing Unit B-B
0-T-31A-147	37A	47W867-4	MCR AHU Condensing Unit Oil Pump Motor Temperature Instrumentation Loop
0-T-31A-148	37A	47W867-4	Oil Cooler HCR AHU Condensing Unit Control Instrumentation Loop
0-ET-31A-151	37A	47W867-4	MCR AHU Condensing Unit B-B Comp. Motor Overload Transmitter
0-LOOP-31A-149	37A	47W867-4	MCR AHU Condensing Unit B-B
0-P-31A-172	37A	47W867-4	MCR AHU Condensing Unit Liquid Pressure Instrumentation Loop
0-P-31A-173	37A	47W867-4	MCR AHU Condensing Unit Liquid Pressure Instrumentation Loop
0-FCO-31A-176	37A	47W867-2	MCR AHU Inlet Bypass Damper
0-T-31A-176	37A	47W867-2	MCR AHU Inlet Damper Control Instrumentation Loop
0-FCO-31A-177	37A	47W867-2	MCR AHU Inlet Bypass Damper
0-T-31A-177	37A	47W867-2	MCR AHU Inlet Damper Control Instrumentation Loop
0-CHR-311-126B-A	37A	47W867-2	MCR Air Conditioning Unit A-A
0-CHR-311-141B-B	37A	47W867-2	MCR Air Conditioning Unit B-B

Control Air (32)

Component	Key	Reference Drawing	Description
0-FSV-32-37	13	47W845-5	Station Air Compressor B Coolant Water Inlet Valve
0-FSV-32-42	13	47W845-5	Station Air Compressor A Coolant Water Inlet Valve
0-FSV-32-61	13	47W845-6	Auxiliary Air Compressor A-A Cooling Water Inlet
0-FSV-32-62	13	47W848-1	Auxiliary Air Compressor A-A Unloader Valve
1-FCV-32-80	13	47W848-1	Control Air Containment Isolation Manual Isolation

Control Air (32) (continued)

Component	Key	Reference Drawing	Description
2-FCV-32-81	13	47W848-1	Control Air Containment Isolation Manual Isolation
0-FCV-32-82	13	47W848-1	Auxiliary Air Compressor A-A Auxiliary Building Isolation
0-PS-32-82	13	47W848-1	Auxiliary Air Compressor A-A Auxiliary Building Isolation Control
0-FCV-32-85	13	47W848-1	Auxiliary Air Compressor B-B Auxiliary Building Isolation Valve
0-PS-32-85	13	47W848-1	Auxiliary Air Compressor B-B Auxiliary Building Isolation Control
0-FSV-32-87	13	47W848-1	Auxiliary Air Compressor B-B Auxiliary Building Isolation
0-FSV-32-88	13	47W848-1	Auxiliary Air Compressor B-B Unloader Valve
1-FCV-32-102	13	47W848-1	Control Air Containment Isolation Manual Isolation
2-FCV-32-103	13	47W848-1	Control Air Containment Isolation Manual Isolation
1-FCV-32-110	7,8,13	47W848-1	Control Air Containment Isolation Manual Isolation
2-FCV-32-111	7,8,13	47W848-1	Control Air Containment Isolation Manual Isolation
0-CMP-032-025	13	47W846-1	Station Air Compressor A
0-CMP-032-26	13	47W846-1	Station Air Compressor B
0-CMP-032-60	13	47W848-1	Aux Air Compressor A
0-CMP-032-86	13	47W848-1	Aux Air Compressor B
Control Circuit for Air Comp A	13	47W846-1	
Control Circuit for Air Comp B	13	47W846-1	
Control Circuit for Aux Air Comp A	13	47W848-1	
Control Circuit for Aux Air Comp B	13	47W848-1	

Service Air (33)

Component	Key	Reference Drawing	Description
0-VLV-33-500	13	47W846-1	Station Air to Control Air Manual Isolation
0-VLV-33-501	13	47W846-1	Station Air to Control Air Manual Isolation

Feedwater Control System (46)

Component	Key	Reference Drawing	Description
1&2-FIC-46-57	14, 15	47W610-46-1	TDAFWP Flow Control Instrument Loop
1&2-SC-46-57	14, 15	47W610-46-1	TDAFWP Speed Control Instrument Loop

Chemical and Volume Control System (62)

Component	Key	Reference Drawing	Description
1&2-F-62-001A	2	47W809-1	RCP 1 Seal Water Flow Instrument Loop
1&2-F-62-014A	2	47W809-1	RCP 2 Seal Water Flow Instrument Loop
1&2-F-62-027A	2	47W809-1	RCP 3 Seal Water Flow Instrument Loop
1&2-F-62-040A	2	47W809-1	RCP 4 Seal Water Flow Instrument Loop
1&2-FCV-62-9	48	47W809-1	RCP Seal Return Isolation Valve
1&2-FCV-62-22	48	47W809-1	RCP Seal Return Isolation Valve
1&2-FCV-62-35	48	47W809-1	RCP Seal Return Isolation Valve
1&2-FCV-62-48	48	47W809-1	RCP Seal Return Isolation Valve
1&2-FCV-62-54	8,48	47W809-1	Excess Letdown Isolation Valve
1&2-FCV-62-55	8,48	47W809-1	Excess Letdown Isolation Valve
1&2-FCV-62-56	8,48	47W809-1	Excess Letdown Isolation Valve
1&2-FCV-62-69	7,48	47W809-1	RCS Loop 3 Letdown Flow Valve
1&2-FCV-62-70	7,48	47W809-1	RCS Loop 3 Letdown Flow Valve
1&2-FCV-62-72	7,48	47W809-1	Regen Heat Exchanger Letdown Isolation Valve
1&2-FCV-62-73	7,48	47W809-1	Regen Heat Exchanger Letdown Isolation Valve
1&2-FCV-62-74	7,48	47W809-1	Regen Heat Exchanger Letdown Isolation Valve
1&2-FCV-62-84	34	47W809-1	Auxiliary Spray Isolation Valve
1&2-FCV-62-85	34	47W809-1	Alternate Charging Flow RCS CL loop 1 Isolation Valve
1&2-FCV-62-86	34	47W809-1	Normal Charging Flow RCS CL Loop 4 Isolation Valve
1&2-FCV-62-89	34	47W809-1	Charging Flow Control Valve
1&2-FCV-62-90	2,34	47W809-1	Charging Flow Isolation Valve
1&2-FCV-62-91	2,34	47W809-1	Charging Flow Isolation Valve
1&2-FCV-62-93	2,34	47W809-1	Charging Header Flow Control Valve
1&2-F-62-93	2	47W809-1	Charging Flow Instrumentation Loop
1-FCV-62-98	1	47W809-1	Centrifugal Charging Pump Minimum Flow Isolation Valve
2-FCV-62-98	1	47W809-1	Centrifugal Charging Pump Minimum Flow Isolation Valve
1-FCV-62-99	1	47W809-1	Centrifugal Charging Pump Isolation Valve
2-FCV-62-99	1	47W809-1	Centrifugal Charging Pump Isolation Valve

APPENDIX C

Chemical and Volume Control System (62) (Continued)

Component	Key	Reference Drawing	Description
1&2-PCV-62-119	5	47W809-1	VCT Isolation From Nitrogen
1&2-PCV-62-120	5	47W809-1	VCT Isolation From Hydrogen
1&2-FSV-62-125	5	47W809-1	VCT Vent Isolation
1&2-PCV-62-126	5	47W809-1	VCT Vent Isolation
1&2-L-62-129A	4	47W809-1	VCT Level Instrumentation Loop
1&2-L-62-130A	4	47W809-1	VCT Level Instrumentation Loop
1&2-LCV-62-132	4,5	47W809-1	VCT Outlet Isolation Valve
1&2-LCV-62-133	4,5	47W809-1	VCT Outlet Isolation Valve
1&2-LCV-62-135	4,5	47W809-1	Charging Pump Flow from RWST
1&2-LCV-62-136	4,5	47W809-1	Charging Pump Flow from RWST
1&2-FCV-62-77	48	47W809-1	Normal Letdown Isolation Valve
1&2-PCV-62-81	48	47W809-1	VCT Letdown Pressure Control Valve
1&2-VLV-62-672	48	47W809-1	PCV by-pass valve
1&2-FCV-62-59	48	47W809-1	Excess Letdown Three-way Valve
1&2-FCV-62-61	48	47W809-1	Excess Letdown Isolation Valve
1&2-FCV-62-63	48	47W809-1	Excess Letdown Isolation Valve
1&2-VLV-62-526	34	47W809-1	Charging Flow Manual Bypass Valve
1&2-VLV-62-527	2	47W809-1	CCP A Manual Isolation to Charging
1&2-VLV-62-534	34	47W809-1	Charging Flow Manual Bypass Valve
1&2-VLV-62-533	2	47W809-1	CCP B Manual Isolation to Charging
1&2-VLV-62-535	2	47W809-1	Charging Flow Manual Isolation Valve
1&2-VLV-62-536	2	47W809-1	Charging Flow Manual Isolation Valve
1&2-VLV-62-537	2	47W809-1	Charging Flow Manual Isolation Valve
1&2-VLV-62-539	2	47W809-1	Charging Flow Manual Isolation Valve
1&2-VLV-62-689	5	47W809-1	VCT Gas Sample Manual Isolation
1&2-VLV-62-692	5	47W809-1	Manual VCT Isolation From Nitrogen
1&2-VLV-62-693	5	47W809-1	Manual VCT Isolation From Hydrogen
1&2-PMP-62-108	1	47W809-1	1&2-Centrifugal Charging Pump A-A
1&2-PMP-62-104	1	47W809-1	1&2-Centrifugal Charging Pump B-B

APPENDIX C

Chemical and Volume Control System (62) (Continued)

Component	Key	Reference Drawing	Description
1&2-PMP-62-247	1	47W610-62-2	CCP Aux Lube Oil Pump A-A
1&2-PMP-62-244	1	47W610-62-2	CCP Aux Lube Oil Pump B-B
1&2-LCV-62-118	48	47W809-1	VCT Level Control Valve
1&2-RV-62-662	48	47W809-1	Normal Letdown to PRT
1&2-VLV-62-723	48	47W809-1	Normal Letdown Header Isolation Valve
1&2-RV-62-636	48	47W809-1	Excess Letdown Relief Valve to PRT
1&2-VLV-62-715	48	47W809-1	Excess Letdown Header Isolation Valve

Safety Injection System (63)

Component	Key	Reference Drawing	Description
1&2-FCV-63-1	30	47W811-1	RWST to RHR Pump Flow Control
1&2-FCV-63-5	5	47W811-1	RWST To SIS Pump Flow Control
1&2-FCV-63-6	5	47W811-1	SIS Pump Inlet To Cvcs Charging Pump
1&2-FCV-63-7	5	47W811-1	SIS Pump Inlet To Cvcs Charging Pump
1&2-FCV-63-8	30	47W811-1	RHR Pump Supply To Ccps Flow Control
1&2-FCV-63-11	30	47W811-1	RHRP Outlet To Sip Inlet Isolation Valve
1&2-FCV-63-25	2,6	47W811-1	SIS CCPIT Shutoff
1&2-FCV-63-26	2,6	47W811-1	SIS CCPIT Shutoff
1&2-FCV-63-39	2,6	47W811-1	SIS CCPIT Shutoff
1&2-FCV-63-40	2,6	47W811-1	SIS CCPIT Shutoff
*1&2-FCV-63-41	6	47W811-1	SIS CCPIT TO CVCS Boric Acid Tank
*1&2-FCV-63-42	6	47W811-1	SIS CCPIT TO CVCS Boric Acid Tank
1&2-FCV-63-47	5	47W811-1	SIS Pump IA-A Inlet Valve
1&2-FCV-63-63	36	47W811-1	AT NO. 4 Nitrogen Isolation Valve
1&2-FCV-63-65	36	47W830-6	AT NO. 4 Nitrogen Vent Valve
1&2-FCV-63-67	36	47W811-1	AT NO. 4 Flow Isolation Valve
1&2-FCV-63-72	5,	47W811-1	Containment Sump Flow Isolation Valve
1&2-FCV-63-73	5,	47W811-1	Containment Sump Flow Isolation Valve
1&2-FCV-63-80	36	47W811-1	AT NO. 3 Flow Isolation Valve
1&2-FCV-63-87	36	47W811-1	AT NO. Nitrogen Isolation Valve
1&2-F-63-091	30	47W811-1	RHR Flow Instrumentation Loop
1&2-F-63-092	30	47W811-1	RHR Flow Instrumentation Loop

*THESE VALVES ARE CLOSED WITH CONTROL AIR REMOVED.

Safety Injection System (63) (Continued)

Component	Key	Reference Drawing	Description
1&2-FCV-63-93	30	47W811-1	RHR Pump A-A Discharge to Cold Leg 2 & 3
1&2-FCV-63-94	30	47W811-1	RHR Pump B-B Discharge to Cold Leg 1 & 4
1&2-FCV-63-98	36	47W811-1	AT NO. 2 Flow Isolation Valve
1&2-FCV-63-107	36	47W811-1	AT NO. 2 Nitrogen Isolation Valve
1&2-FCV-63-118	36	47W811-1	AT NO. 1 Flow Isolation Valve
1&2-FCV-63-127	36	47W811-1	AT NO. 1 Nitrogen Isolation Valve
1&2-FCV-63-172	30	47W811-1	RHR Hot Leg Injection Isolation Valve
1&2-HS-63-133A	SI	47W811-2	SI ACTUATION Handswitch in MCR
1&2-HS-63-133B	SI	47W811-2	SI ACTUATION Handswitch in MCR
1&2-VLV-63-574	6	47W811-1	SIS CCPIT Outlet Valve to Boric Acid and CVCS Holdup Tanks

ESSENTIAL RAW COOLING WATER (67)

Component	Key	Reference Drawing	Description
0-FCV-67-12	3	47W845-1	ERCW Header A Return Discharge Canal Shutoff Valve
0-FCV-67-14	3	47W845-1	ERCW Header A Return Discharge Canal Shutoff Valve
* 1-FCV-67-22	3	47W845-1	ERCW HDR 1A/2A Cross-Tie
*2-FCV-67-22	3	47W845-1	ERCW 2A/1A Cross-Tie
* 1-FCV-67-24	3	47W845-1	ERCW HDR 1B/2B Cross-Tie
* 2-FCV-67-24	3	47W845-1	ERCW HDR 2B/1B Cross-Tie
1&2-FCV-67-66	3	47W845-1	DG Heat Exchanger Isolation Valve
1-FCV-67-162	37-O	47W845-6	CCS & AFW Pump Space Cooler Isolation Valve
1-FCV-67-164	37-O	47W845-6	CCS & AFW Pump Space Cooler Isolation Valve
2-FCV-67-217	37-O	47W845-4	BA & AFW Pump Space Cooler Isolation Valve
2-FCV-67-219	37-O	47W845-4	BA & AFW Pump Space Cooler Isolation Valve

*THESE VALVES HAVE POWER REMOVED

APPENDIX C

Essential Raw Cooling Water (67) (Continued)

Key Component	Reference	Drawing	Description
1&2-FCV-67-66	3	47W845-1	DG Hx Isolation Valve
1&2-FCV-67-67	3	47W845-1	DG Hx Isolation Valve
1-FCV-67-81	3	47W845-2	Auxiliary Building ERCW Supply Header 1A Isolation Valve
2-FCV-67-81	3	47W845-2	Auxiliary Building ERCW Supply Header 2A Isolation Valve
1-FCV-67-82	3	47W845-2	Auxiliary Building ERCW Supply Header 1B Isolation Valve
2-FCV-67-82	3	47W845-2	Auxiliary Building ERCW Supply Header 2B Isolation Valve
1-FCV-67-123	3,19	47W845-2	Containment Spray Heat Exchanger 1B Supply Control Valve
2-FCV-67-123	3,19	47W845-2	Containment Spray Heat Exchanger 2B Supply Control Valve
1-FCV-67-124	3,19	47W845-2	Containment Spray Heat Exchanger 1B Discharge Valve
2-FCV-67-124	3,19	47W845-2	Containment Spray Heat Exchanger 2B Discharge Valve
1-FCV-67-125	3,19	47W845-2	Containment Spray Heat Exchanger 1A Supply Control Valve
2-FCV-67-125	3,19	47W845-2	Containment Spray Heat Exchanger 2A Supply Control Valve
1-FCV-67-126	3,19	47W845-2	Containment Spray Heat Exchanger 1A Discharge Valve
2-FCV-67-126	3,19	47W845-2	Containment Spray Heat Exchanger 2A Discharge Valve
1-FCV-67-127	3,13	47W845-2	Supply Valve for ERCW Flow to Air Conditioning Equipment 1A, and Service Air Compressor
2-FCV-67-127	3	47W845-2	Supply Valve for ERCW Flow to Air Conditioning Equipment 2A
1-FCV-67-128	3,13,	47W845-2	Supply Valve for ERCW Flow to Air Conditioning Equipment 1B, and Service Air Compressor
2-FCV-67-128	3	47W845-2	Supply Valve for ERCW Flow to Air Conditioning Equipment 2B
1-FCV-67-146	70	47W845-2	CCS Heat Exchanger 1A1/1A2 Discharge Control Valve
2-FCV-67-146	70	47W845-2	CCS Heat Exchanger 2A1/2A2 Discharge Control Valve

Essential Raw Cooling Water (67) (Continued)

Component	Key	Reference Drawing	Description
1-FCV-67-147	3	47W845-2	Cross Connect Valve, Main Supply Contro Header 1A
2-FCV-67-147	3,19	47W845-2	Cross Connect Valve, Main Supply Header 2B
0-FCV-67-151	70	47W845-2	CCS Heat Exchanger 0B1/0B2 Discharge Control Valve
0-FCV-67-152	70	47W845-2	CCS Heat Exchanger 0B1/0B2 Discharge Control Valve
1-FCV-67-168	3,37R	47W845-6	Supply Valve for ERCW Flow to CCP Room Cooler 1A
2-FCV-67-168	3,37R	47W845-4	Supply Valve for ERCW Flow to CCP Room Cooler 2A
1-FCV-67-170	3,37R	47W845-6	Supply Valve for ERCW Flow to CCP Room Cooler 1B
2-FCV-67-170	3,37R	47W845-4	Supply Valve for ERCW Flow to CCP Room Cooler 2B
1-FCV-67-188	40	47W845-6	Supply Valve for ERCW Flow to RHR Pump Room Cooler 1A
2-FCV-67-188	40	47W845-4	Supply Valve for ERCW Flow to RHR Pump Room Cooler 2A
1-FCV-67-190	40	47W845-6	Supply Valve for ERCW Flow to RHR Pump Room Cooler 1B
2-FCV-67-190	40	47W845-4	Supply Valve for ERCW Flow to RHR Pump Room Cooler 2B
0-TCV-67-197	37A	47W845-6	MCR A/C Discharge Isolation
0-TCV-67-201	37A	47W845-6	MCR A/C Discharge Isolation
0-FCV-67-205	13	47W845-5	Station Service and Control Air Compressor Supply Header A Isolation Valve
0-FCV-67-208	13	47W845-5	Station Service and Control Air Compressor Supply Header 1B Isolation Valve
1&2-FCV-67-223	3 19	47W845-2	Supply Header 1B to Header 2A Isolation Valve
0-FCV-67-364	3	47W845-1	Header A Return Discharge Canal Shutoff Valve
0-FCV-67-365	3	47W845-1	Header A Return Discharge Canal Shutoff Valve
1-FCV-67-424	3,19	47W845-2	ERCW HDR 1B to HDR 2A Isolation Valve

Essential Raw Cooling Water (67) (Continued)

Component	Key	Reference Drawing	Description
0-FCV-67-478	70,19	47W845-2	Supply Valve ERCW to Component Coolant Heat Exchanger 1A1/1A2
1-FCV-67-489	3	47W845-5	ERCW Strainer B1B-B Isolation Valve
2-FCV-67-489	3	47W845-5	ERCW Strainer B2B-B Isolation Valve
1&2-VLV-67-1073	3	47W845-5	Strainer B Backwash Isolation Valve
1&2-VLV-67-1070	3	47W845-5	Strainer A Backwash Isolation Valve
1-FCV-67-492	3	47W845-5	ERCW Strainer A1A-A Isolation Valve
2-FCV-67-492	3	47W845-5	ERCW Strainer A2A-A Isolation Valve
0-PMP-67-432	3	47W845-5	ERCW Pump J-A
0-PMP-67-436	3	47W845-5	ERCW Pump K-A
0-PMP-67-460	3	47W845-5	ERCW Pump Q-A
0-PMP-67-464	3	47W845-5	ERCW Pump R-A
0-PMP-67-440	3	47W845-5	ERCW Pump L-B
0-PMP-67-444	3	47W845-5	ERCW Pump M-B
0-PMP-67-452	3	47W845-5	ERCW Pump N-B
0-PMP-67-456	3	47W845-5	ERCW Pump P-B
1-STN-67-491	3	47W845-5	ERCW Strainer A1A-A for Header 1A
2-STN-67-491	3	47W845-5	ERCW Strainer A2A-A for Header 2A
1-STN-67-490	3	47W845-5	ERCW Strainer B1AB-B for Header 1B
2-STN-67-490	3	47W845-5	ERCW Strainer B2B-B for Header 2B
ERCW Header 2A&1B	3	47W845-1,5	
ERCW Header 2B&1A	3	47W845-1,5	
0-PMP-67-470	3	47W845-5	Screen Wash Pump A-A
0-PMP-67-477	3	47W845-5	Screen Wash Pump B-B
0-PMP-67-482	3	47W845-5	Screen Wash Pump C-B
0-PMP-67-487	3	47W845-5	Screen Wash Pump D-A
0-SCN-67-471	3	47W845-5	Traveling Screen A-A
0-SCN-67-475	3	47W845-5	Traveling Screen B-B
0-SCN-67-480	3	47W845-5	Traveling Screen C-B
0-SCN-67-485	3	47W845-5	Traveling Screen D-A

Reactor Coolant (68)

Component	Key	Reference Drawing	Description
1&2-T-68-1	28	47W610-68-1	Loop 1 Hot Leg Temperature Instrumentation Loop
1&2-T-68-18	28	47W610-68-1	Loop 1 Cold Leg Temperature Instrumentation Loop
1&2-T-68-24	28	47W610-68-2	Loop 2 Hot Leg Temperature Instrumentation Loop
1&2-T-68-41	28	47W610-68-2	Loop 2 Cold Leg Temperature Instrumentation Loop
1&2-T-68-43	28	47W610-68-3	Loop 3 Hot Leg Temperature Instrumentation Loop
1&2-T-68-60	28	47W610-68-3	Loop 3 Cold Leg Temperature Instrumentation Loop
1&2-T-68-65	28	47W610-68-4	Loop 4 Hot Leg Temperature Instrumentation Loop
1&2-P-68-66	28	47W610-68-7	RCS Pressure Instrumentation Loop for PI-68-66A
1&2-P-68-69	28	47W610-68-7	RCS Pressure Instrumentation Loop for PR-68-69
1&2-T-68-83	28	47W610-68-4	Loop 4 Cold Leg Temperature Instrumentation Loop
1&2-L-68-320	2	47W610-68-5	Pressurizer Level Instrumentation Loop
1&2-P-68-323	SI	47W813-1	Pressurizer Pressure Instrumentation Loop
1&2-FCV-68-332	28,48	47W813-1	Pressurizer Relief Block Valve
1&2-FCV-68-333	28,48	47W813-1	Pressurizer Relief Block Valve
1&2-PCV-68-334	7,28,48	47W813-1	Pressurizer PORV
1&2-P-68-334	SI	47W813-1	Pressurizer Pressure Instrumentation Loop
1&2-L-68-335	2	47W610-68-5	RCS Pressurizer Water Level
1&2-L-68-339	2	47W610-68-5	RCS Pressurizer Water Level
1&2-P-68-340	SI	47W813-1	Pressurizer Pressure Instrumentation Loop
1&2-PCV-68-340A	7,28,48	47W813-1	Pressurizer PORV
1&2-PCV-68-340B	28	47W813-1	Pressurizer Spray Valve
1&2-PCV-68-340D	28	47W813-1	Pressurizer Spray Valve
1&2-P-68-342C	28	47W610-68-5	Pressurizer Pressure Instrumentation Loop for PI-68-342A
1&2-FSV-68-394	28,7,48	47W813-1	Reactor Vessel Head Vent Isolation Valve
1&2-FSV-68-395	28,7,48	47W813-1	Reactor Vessel Head Vent Isolation Valve
1&2-FSV-68-396	28,7,48	47W813-1	Reactor Vessel Head Vent Throttle Valve
1&2-FSV-68-397	28,7,48	47W813-1	Reactor Vessel Head Vent Throttle Valve

Component Cooling Water System (70)

Component	Key	Reference Drawing	Description
0-FCV-70-1	70	47W859-1	SFPCS HX B Outlet Isolation Valve
1&2-FCV-70-2	70	47W859-1	RHR HTX A Inlet Valve
1&2-FCV-70-3	70	47W859-1	RHR HTX B Inlet Valve
1&2-FCV-70-4	9	47W859-1	Miscellaneous Equip. Header Inlet Valve
1-FCV-70-8	70	47W859-1	CCS HTX 1A1/1A2, Outlet Isolation Valve
1-FCV-70-9	70	47W859-1	CCS HTX 1A1/1A2 & 0B1/0B2, Outlet Isolation Valve
1-FCV-70-10	70	47W859-1	CCS HTX 1A1/1A2 & 0B1/0B2, Outlet Isolation Valve
0-FCV-70-11	70	47W859-1	SFPCS Hx A Outlet Isolation Valve
0-FCV-70-12	70	47W859-1	CCS HTX 0B1/0B2 Outlet Isolation Valve
1-FCV-70-13	70	47W859-1	CCS HTX 1A1/1A2 & 0B1/0B2, Inlet Isolation Valve
2-FCV-70-14	70	47W859-1	CCS HTX 2A1/2A2 & 0B1/0B2, Inlet Isolation Valve
2-FCV-70-15	70	47W859-1	CCS HTX 2A1/2A2 Outlet Isolation Valve
2-FCV-70-16	70		CCS Hx 2A1/2A21 Inlet Isolation Valve
2-FCV-70-18	70	47W859-1	CCS HTX 2A1/2A2 & 0B1/0B2, Inlet Isolation Valve
0-FCV-70-22	70	47W859-1	CCS HTX 0B1/0B2 Inlet Isolation Valve
1-FCV-70-23	70	47W859-1	CCS HTX 1A1/1A2 & 0B1/0B2, Inlet Isolation Valve
1-FCV-70-25	70	47W859-1	CCS HTX 1A1/1A2 Inlet Valve
1-FCV-70-26	70	47W859-1	CCS Pumps 1A-A and 1B-B to C-S Outlet Isolation Valve
1-FCV-70-27	70	47W859-1	CCS Pumps 1A-A and 1B-B to C-S Outlet Isolation Valve
2-FCV-70-28	70	47W859-1	CCS Pump 2A-A and 2B-B to C-S Outlet
2-FCV-70-29	70	47W859-1	CCS Pump 2A-A and 2B-B to C-S Outlet Isolation Valve
0-FCV-70-34	70	47W859-1	CCS Pump 1A-A to 1B-B Inlet Isolation Valve
0-FCV-70-39	70	47W859-1	CCS Pump 2A-A to 2B-B Inlet Isolation Valve
0-FCV-70-40	70	47W859-1	SFPCS Hx A Inlet Isolation Valve
0-FCV-70-41	70	47W859-1	SFPCS Hx B Inlet Isolation Valve

Component Cooling Water System (70) (Continued)

Component	Key	Reference Drawing	Description
1-FCV-70-64	70	47W859-1	CCS Pumps 1A-A and 1B-B to C-S Inlet Isolation Valve
1-FCV-70-74	70	47W859-1	CCS Pumps 1A-A and 1B-B to C-S Inlet Isolation Valve
1&2-FCV-70-75	70	47W859-1	RHR Heat Exchanger B Return Header Isolation Valve
2-FCV-70-76	70	47W859-1	CCS Pumps 2A-A and 2B-B to C-S Inlet Isolation Valve
2-FCV-70-78	70	47W859-1	CCS Pumps 2A-A and 2B-B to C-S Inlet Isolation Valve
1&2-F-70-81A	9	47W859-2,3	CCS Containment Flow Instrumentation Loop
1&2-F-70-81B	9	47W859-2,3	CCS Containment Flow Instrumentation Loop
1&2-F-70-81D	9	47W859-2,3	CCS Containment Flow Instrumentation Loop
1&2-F-70-81E	9	47W859-2,3	CCS Containment Flow Instrumentation Loop
1&2-FCV-70-87	9	47W859-2,3	Reactor Coolant Pump Thermal Barrier Return Isolation Valve
1&2-FCV-70-90	9	47W859-2,3	Reactor Coolant Pump Thermal Barrier Return Isolation Valve
1&2-FCV-70-133	9	47W859-2,3	Reactor Coolant Pump Thermal Barrier Coolant Isolation Valve
1&2-FCV-70-134	9	47W859-2,3	Reactor Coolant Pump Thermal Barrier Coolant Isolation Valve
1&2-FCV-70-153	70,31	47W859-4	RHR Heat Exchanger B Outlet Valve
1&2-FCV-70-156	70,31	47W859-4	RHR Heat Exchanger A Outlet Valve
0-FCV-70-193	70	47W859-1	SFPCS Heat Exchanger A & B Inlet Valve
1&2-FCV-70-85	48	47W859-2,3	CCS to Excess Letdown HX
1&2-FCV-70-143	48	47W859-2,3	CCS to Excess Letdown HX
1&2-TCV-70-192	48	47W859-2,3	CCS to Letdown HX
0-FCV-70-194	70	47W859-1	SFPCS Heat Exchanger A & B Inlet Valve
2-FCV-70-195	70	47W859-1	CCS HTX 2A1/2A2 & 0B1/0B2, Outlet Isolation Valve
2-FCV-70-196	70	47W859-1	CCS HTX 2A1/2A2 & 0B1/0B2, Outlet Isolation Valve

Component Cooling Water System (70) (Continued)

Component	Key	Reference Drawing	Description
0-FCV-70-197	70	47W859-1	SFPCS HTX Supply Header Valve
0-VLV-70-529A	70	47W859-1	SFPCS HTX A Outlet Manual Isolation Valve
0-VLV-70-529B	70	47W859-1	SFPCS HTX B Outlet Manual Isolation Valve
1&2-VLV-70-531	70	47W859-1	SFPCS HTX Return Manual Isolation Valve
0-FCV-70-198	70	47W859-1	SFPCS HTX Supply Header Valve
1&2-VLV-70-545A	70	47W859-4	RHR A Inlet Isolation Valve
1&2-VLV-70-545B	70	47W859-4	RHR B Inlet Isolation Valve
1&2-VLV-70-546A	70	47W859-4	RHR HTX A Outlet Valve
1&2-VLV-70-546B	70	47W859-4	RHR HTX 1A-A Outlet Valve
1&2-VLV-70-574	31	47W859-2&3	Non Regen Letdown HTX Manual Inlet
1&2-VLV-70-587	31	47W859-2	Non Regen Letdown HTX Manual Outlet
0-VLV-70-601	31	47W859-2	Aux Waste Evaporator Inlet isolation
0-VLV-70-636	31	47W859-2	Aux Waste Evaporator Outlet isolation
1&2-VLV-70-637	31	47W859-2,3	BAE&GS Inlet Isolation Valve
1&2-VLV-70-661	31	47W859-2,3	BAE&GS Outlet Isolation Valve
1-PMP-70-046	70	47W859-1	CCS Pump 1A-A
1-PMP-70-038	70	47W859-1	CCS Pump 1B-B
2-PMP-70-059	70	47W859-1	CCS Pump 2A-A
2-PMP-70-033	70	47W859-1	CCS Pump 2B-B
0-PMP-70-051	70	47W859-1	CCS Pump C-S
1&2-PMP-70-131	9	47W859-2,3	RCP Thermal Barrier Booster Pump A-A
1&2-PMP-70-130	9	47W859-2,3	RCP Thermal Barrier Booster Pump B-B

Containment Spray (72)

Component	Key	Reference Drawing	Description
1&2-FCV-72-2	5	47W812-1	Containment Spray Header B Isolation Valve
1&2-FCV-72-20	5	47W812-1	Containment Sump Isolation to CSPs
1&2-FCV-72-21	5	47W812-1	Containment Spray Pump RWST Isolation
1&2-FCV-72-22	5	47W812-1	Containment Spray Pump RWST Isolation

1&2-FCV-72-23	5	47W812-1	Containment Sump Isolation to CSPs

Containment Spray (72) (continued)

Component	Key	Reference Drawing	Description
1&2-FCV-72-39	5	47W812-1	Containment Spray Header A Isolation Valve
1&2-FCV-72-40	5, 30	47W812-1	RHR Spray Header A Isolation Valve
1&2-FCV-72-41	5, 30	47W812-1	RHR Spray Header B Isolation Valve
1,2-PMP-72-27	5	47W812-1	Containment Spray Pump A-A
1,2-PMP-72-10	5	47W812-1	Containment Spray Pump B-B

Residual Heat Removal (74)

Component	Key	Reference Drawing	Description
1&2-FCV-74-1	7,30	47W810-1	RHR System Isolation Valve
1&2-FCV-74-2	7,30	47W810-1	RHR System Isolation Valve
1&2-FCV-74-3	30	47W810-1	RHR Pump A-A Inlet Flow Control Valve
1&2-FCV-74-12	5,30	47W810-1	RHR Pump A-A Min Flow Valve
1&2-FCV-74-16	30	47W810-1	RHR HTX A Outlet Flow Control Valve
1&2-FCV-74-21	30	47W810-1	RHR Pump B-B Inlet Flow Control Valve
1&2-FCV-74-24	5,30	47W810-1	RHR Pump B-B Mini Flow Valve
1&2-FCV-74-28	30	47W810-1	RHR HTX B Outlet Flow Control Valve
1&2-FCV-74-32	30	47W810-1	RHR HTX Bypass Flow Control Valve
1&2-FCV-74-33	30	47W810-1	RHR HTX A Bypass Valve
1&2-FCV-74-35	30	47W810-1	RHR HTX B Bypass Valve
1&2-HCV-74-36	30	47W810-1	RHR HTX A Bypass Valve
1&2-HCV-74-37	30	47W810-1	RHR HTX B Bypass Valve
1&2-PMP-74-10	31,4,5	47W810-1	RHR Pump A-A
1&2-PMP-74-20	31,4,5	47W810-1	RHR Pump B-B

Waste Disposal System (77)

Component	Key	Reference Drawing	Description
0-PCV-77-89	5	47W830-4	Waste Gas Compressor Isolation From VCT Vent Path

Neutron Monitoring System (92)
and
Reactor Protection System (99)

Component	Key	Reference Drawing	Description
1&2-HS-RT-001	29	47W611-99-1	Reactor Trip Hand Switch A
1&2-HS-RT-002	29	47W611-99-1	Reactor Trip Hand Switch B
1&2-XI-92-5001B	29	47W611-99-2	Source Range Detector Count Rate N31
1&2-XI-92-5002B	29	47W611-99-2	Source Range Detector Count Rate N31
1&2-BCTF-99-CU/1B-A	29	47W611-99-1	Reactor Trip Breaker A
1&2-BCTF-99-CU/1C-B	29	47W611-99-1	Reactor Trip Breaker B
1&2-BCTB-85-DE/4D	29	47W611-99-1	Rod Drive Motor Generator Set Breaker
1&2-BCTB-85-DF/3B	29	47W611-99-1	Rod Drive Motor Generator Set Breaker

INSTRUMENTATION LIST FOR MAIN CONTROL ROOM

Indicator			Description
LI-68-339A			Pressurizer Water Level
LI-68-320	One of three		Pressurizer Water Level
LI-68-335A			Pressurizer Water Level
PI-68-342A			RCS WR Pressure
PI-68-66A	One of three		RCS WR Pressure
PI-68-69			RCS WR Pressure
PI-1-2A	Either one		SG-1 Steam Press
PI-1-2B			SG-1 Steam Press
PI-1-9A	Either one		SG-2 Steam Press
PI-1-9B			SG-2 Steam Press
PI-1-20A	Either one	Two Loops Required	SG-3 Steam Press
PI-1-20B			SG-3 Steam Press
PI-1-27A	Either one		SG-4 Steam Press
PI-1-27B			SG-4 Steam Press
LI-3-43A			
LI-3-174			
LI-3-164			
LI-3-38*	Either one		SG-1 NR Level
LI-3-39			SG-1 NR Level
LI-3-56A			
LI-3-156			
LI-3-173			
LI-3-51*	Either one		SG-2 NR Level
LI-3-52			SG-2 NR Level
LI-3-98A			
LI-3-172			
LI-3-148			
LI-3-93*	Either one		SG-3 NR Level
LI-3-94			SG-3 NR Level
LI-3-111A			
LI-3-175			
LI-3-171			
LI-3-106*	Either one		SG-4 NR Level
LI-3-107			SG-4 NR Level

INSTRUCTIONS LIST FOR MAIN CONTROL ROOM

Indicator		Description
TI-68-1	Two Loops required	RCS Loop 1 Hot Leg
TI-68-18		RCS Loop 1 Cold Leg
TI-68-24		RCS Loop 2 Hot Leg
TI-68-41		RCS Loop 2 Cold Leg
TI-68-43		RCS Loop 3 Hot Leg
TI-68-60		RCS Loop 3 Cold Leg
TI-68-65		RCS Loop 4 Hot Leg
TI-68-83		RCS Loop 4 Cold Leg
F-062-001		RCP 1 Seal Water Flow
F-062-014		RCP 2 Seal Water Flow
F-062-027		RCP 3 Seal Water Flow
F-062-040		RCP 4 Seal Water Flow
1-T-062-004		RCP 1 Seal Temperature
1-T-062-017		RCP 2 Seal Temperature
1-T-062-030		RCP 3 Seal Temperature
1-T-062-043		RCP 4 Seal Temperature

Source Range Flux Monitor

XI-92-5001B	Either one
XI-92-5002B	

Condensate Storage Tank Level

1. LI-2-230A	Either one for Tank A (Note 1)
2. LI-2-230D	
3. LI-2-233A	Either one for Tank B (Note 1)
4. LI-2-233D	

Chemical and Volume Control

1. LI-62-129 (Tank Level-VCT)	Note 2
2. FI-62-93A (Charging Flow)	Note 3

Note 1: If MCR indication is not available, local monitoring of tank level or AFW suction pressure is acceptable
Note 2: Refer to key 4 for actions if this level indication is not available.
Note 3: This indicator is only required if the normal charging path is chosen in key 2.

*Denotes steam generator level transmitters whose sense lines have been verified as being unaffected by a fire inside containment (Reference 11.21). Only the sense lines are Appendix R equipment (i.e., the cabling was not evaluated).

INSTRUMENTATION LIST FOR AUXILIARY CONTROL ROOM

Pressurizer Pressure and Level

Level

1. LI-68-325C Either one
2. LI-68-326C

Pressure

1. PI-68-336C
2. PI-68-337C One of three
3. PI-68-342C

Reactor Coolant Hot Leg Temperature

1. TI-68-1C (Loop 1)
2. TI-68-24C (Loop 2) All four loops
3. TI-68-43C (Loop 3)
4. TI-68-65C (Loop 4)

Steam Generator Pressure and Level

Pressure

1. PI-1-1C (Loop 1)
2. PI-1-8C (Loop 2) All four loops
3. PI-1-19C (Loop 3)
4. PI-1-26C (Loop 4)

Level

1. LIC-3-164 (Loop 1)
2. LIC-3-156 (Loop 2) All four loops
3. LIC-3-148 (Loop 3)
4. LIC-3-171 (Loop 4)

Source Range Flux Monitor

1. XI-92-5

Level Indication for Tanks

Volume Control Tank

1. LI-62-129C
2. LI-62-130C

INSTRUMENTATION LIST FOR AUXILIARY CONTROL ROOM

Diagnostic Instrumentation for Shutdown Systems

Auxiliary Feedwater System

1.	FI-3-163C (Loop 1)	
2.	FI-3-155C (Loop 2)	All four loops
3.	FI-3-147C (Loop 3)	
4.	FI-3-170C (Loop 4)	
5.	FI-3-142C (Aux FPT Disch)	

Chemical and Volume Control Tank

1. TI-62-80C (Ltdn Ht Exch Outlet)
2. PI-62-92C (Chg Hdr Press)
3. FI-62-93C (Chg Hdr Flow)
4. FI-62-137C (Emer Boration)

Safety Injection System

1.	FI-63-91C (RHR Pmp A-A to RCS 2&3 CL)	Either one
2.	FI-63-92C (RHR Pmp B-B to RCS 1&4 CL)	

Essential Raw Cooling Water

1.	FI-67-61C (ERCW Supply Hdr A)	Either one
2.	FI-67-62C (ERCW Supply Hdr B)	

Residual Heat Removal

1.	TI-74-38C (RHR Htx A Outlet Temp)	Either one
2.	TI-74-40C (RHR Htx B Outlet Temp)	

1.0 INTRODUCTION

This part documents the methodology used to satisfy 10CFR50 Appendix R Section III.J & III.0.

III.J requires emergency lighting units with at least an 8-hour battery power supply in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Section III.0 requires the reactor coolant pump to be equipped with an oil collection system if the containment is not inerted during normal operation.

2 .0 EMERGENCY LIGHTING

Emergency lighting units with at least an 8-hour battery power supply are provided in areas needed for operation of safe shutdown equipment and in access and egress routes as required by 10CFR50 Appendix R, Section III.J. Emergency lighting is provided for Appendix R fire scenarios that require manual operator actions (ref. 4.1.1) within the first 8 hours in order to ensure safe shutdown capability. Turbine Building lighting has been reviewed to determine if 8-hour battery powered emergency lights would be required for fires in either the Auxiliary Building or the Control Building. The Turbine Building lights are fed from the 6.9kv Common Board (located in the Turbine Building) and will not be lost for a fire in either the Auxiliary or Control Building that would require manual action(s) in the Turbine Building. Portable lanterns are also available for performance of manual actions (ref. 4.1.2) and in the event access is required to remote areas of the site (e.g. yard, DGB, ERCW pumping station, Reactor Building). Additionally, although cable separation analysis has not been included in the safe shutdown analysis, permanently installed standby lighting powered by the shutdown boards (LS lighting cabinets) and emergency lighting powered by vital batteries (LD lighting cabinets) will contribute to the lighting levels in the plant. The DGB has lighting provided by lighting cabinets that are separated by three hour fire barriers. The security system provides lighting for the yard areas.

Plant walkdowns have been conducted to assess the adequacy of the 8 hour emergency lighting units in access/egress routes to manual action locations in the plant and at the manual action locations. The adequacy of this emergency lighting was evaluated by fire protection engineers and/or plant operators who would be responsible for performing the manual actions during an Appendix R event (ref. 4.1.3). Walkdown checklists for the emergency lighting units provided for manual action locations and access/egress routes were performed (ref. 4.1.4). Additional lighting units were added and existing units modified/adjusted to achieve additional lighting (ref. 4.1.5).

Functional tests are specified by the Surveillance Requirements (Part II, Section 14.7) and are detailed in approved instructions (ref. 4.1.6), which are performed on the emergency battery lighting units by simulating a loss of power. OR 3.7.14, SR 4.7.14 and the Bases for Section 14.7 of Part II of the FPR provide the operating and surveillance requirements, and the technical bases for those requirements.

Emergency lighting units with 8-hr battery supply are provided with unique identification numbers in the locations listed in Table V-1. The illuminated components and/or areas are also listed.

3.0 REACTOR COOLANT PUMP OIL COLLECTION

The reactor coolant pumps (RCPs) are equipped with an oil collection system. The oil collection system is designed, engineered, and installed such that failure of oil containing components on the RCPs will not lead to fire during normal or design basis accident conditions. Additionally, there is reasonable assurance that the system will with-stand the Safe Shutdown Earthquake.

The oil collection system is capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil system. The oil leakage is safely collected and drained to a vented closed sump.

The drain piping located between the oil collection basins (around the pump) and the containment floor (oil drains to the auxiliary reactor building sump), is designed to category I (L) requirements so the piping will not fail during a safe shutdown earthquake and damage nuclear safety-related equipment. The drain piping has not been designed to maintain its pressure boundary integrity after the event. The RCP lubricating oil system, and the auxiliary reactor building sump are designed to seismic category I requirements so they will not fail during a safe shutdown earthquake (ref. 4.1.7). The total system provides more than reasonable assurance that a RCP lubricating oil fire will not occur as a result of a seismic event.

The RCP oil collection system does not have the capacity to hold the entire contents from all four RCP lubricating oil systems. The reactor coolant pump motors, the lubricating oil systems, and the auxiliary reactor building (pocket) sump are all designed to seismic category I requirements so they will not fail during a safe shutdown earthquake. Therefore, assuming only a single random failure, the oil collection system would only be required to hold the oil resulting from the largest spill due to such a single failure. The largest single failure is the rupture of the upper bearing oil system of one RCP, which contains 240 gallons of oil. The auxiliary reactor building sump holds approximately 200 gallons. Additional storage capacity of 140 gallons is available in the embedded piping systems for a total of 340 gallons of capacity (ref. 4.1.8). Annunciator response instructions require the operator to pump the auxiliary reactor building sump down in the event of a RCP high/low oil reservoir alarm in order to ensure adequate capacity is available for oil collection (4.1.9).

The sump vents do not require the installation of flame arresters because the high flashpoint characteristics of the reactor coolant pump lube oil preclude the hazard of fire flashback.

Refer to Part VII of this FPR for deviations to Section III.0.

4.0 REFERENCES

4.1 TVA Documents

4.1.1 SQN-SQS4-0127, "Equipment Required for Safe Shutdown per 10CFR50 Appendix R"

4.1.2 AOP-C.04, "Control Room Inaccessibility"

4.1.3 Appendix R Project Documentation of Emergency Lighting: S01 85906 823, S01 851223 916, S01 860214 805, S53 850822 916, S01 850517 892, S01 850424 819, S01 860507 949

4.1.4 Memo from R.S. Egli to I. M. Heatherly, dated May 9, 1994, "Walkdown of Emergency Lighting Required for Appendix R Fire Safe Shutdown Manual Actions", (B38 940509 800)

4.1.5 Modifications to Add Additional Appendix R Lights: ECN L5984, ECN L6287, DCN M00558D, DCN M09611B, DCN F10041A, DCN F11358A, DCN F12153A, DCN M12538A for the aiming and remote locating of 10 lamps, and DCN D20071A/P20872A for remote locating 2 lamps and the aiming of 6 lamps.

4.1.6 MI-10.56, "Emergency Lighting (Appendix R)"

4.1.7 Design Criteria, DC-V-3.0, "The Classification of Piping, Pumps, Valves, and Vessels."

4.1.8 Memo from J. H. Sullivan to Appendix R Project Files, "RCP Oil Collection System", S01 841206 919

4.1.9 1- & 2-AR-M5-B, "Annunciator Response"

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R001	749.0, Stair #8	Up/Dn Stairs
0-LGT-247-R002	749.0, A3/r-s	RX MOV BD 1B1-B, 1B2-B, Vital Battery Charger I and its Transfer switch, Inverters 0-I, 1-I and 2-I
0-LGT-247-R003	749.0, A8/s	Vital Battery Charger II and its Transfer switch, Spare Charger 1-S and its Transfer switches, Inverters 0-II, 1-II and 2-II
0-LGT-247-R004	749.0, A8/s	Vital Battery Charger III and its Transfer switch, Spare Charger 2-S and its Transfer switches, Inverters 0-III, 1-III and 2-III
0-LGT-247-R005	749.0, A13/r-s	RX MOV BD 2B1-B, 2B2-B, Vital Battery Charger IV and its Transfer switch, Inverters 0-IV, 1-IV and 2-IV
0-LGT-247-R006	749.0, Stair #7	Up/Dn Stairs & Door
0-LGT-247-R007	749.0, A13/s-t	RX MOV BD 2A1-A, 2A2-A
0-LGT-247-R008	749.0, A8/s-t	General Area
0-LGT-247-R009	749.0, A8/s-t	General Area
0-LGT-247-R010	749.0, A3/s-t	RX MOV BD 1A1-A, 1A2-A
0-LGT-247-R011	749.0, A14/q	2A-A Exh Fan Dampers& General Area
0-LGT-247-R012	749.0, A14/s	2A-A Exh Fan Dampers& General Area
0-LGT-247-R013	749.0, A14/t	2B-B Exh Fan Dampers& General Area
0-LGT-247-R014	749.0, A14/u	2B-B Exh Fan Dampers& General Araa
0-LGT-247-R015	759.0, A12/v	Stair S3
0-LGT-247-R016	759.0, A12/w	General Area
0-LGT-247-R017	759.0, Stair #9	Up/Dn Stairs & Doors
0-LGT-247-R018	759.0, A4/v	CRDM MG SET BKR A & B, General Area
0-LGT-247-R019	759.0, A4/w	CRDM MG SET BKR A & B, General Area

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R020	732.0, C2/n	General Area, Chiller Package B, TCV-67-201
0-LGT-247-R021	732.0, Stair C1	Up/Dn Stairs & Door

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

0-LGT-247-R022	732.0, C4/p	General Area, PNL 1-M-9 Req by OPS
0-LGT-247-R023	732.0, C5/n	Req By OPS,PNL 1-M-3
0-LGT-247-R024	732.0, C5/n	Req By OPS, PNL-1-M-2
0-LGT-247-R025	732.0, C6/n	Req By OPS, PNL 1-M-1
0-LGT-247-R026	732.0, C6/n	Up/Dn Corridor
0-LGT-247-R027	732.0, C7/n	Req By OPS, PNL-0-M-12
0-LGT-247-R028	732.0, C7/n	OPS Req, MID MCR Desk
0-LGT-247-R029	732.0, C8/n	Up/Dn Corridor
0-LGT-247-R030	732.0, C8/n	Req by OPS, PNL 2-M-6
0-LGT-247-R031	732.0, C8/n	Req by OPS, PNL 2-M-6
0-LGT-247-R032	732.0, C9/n	Req by OPS, PNL 2-M-5
0-LGT-247-R033	732.0, C10/n-p	General Area, PNL 2M-9 Req by OPS
0-LGT-247-R034	732.0, C9/q	OPS Req, PNL 2-M-1 & 2 -M-2
0-LGT-247-R035	732.0, C8/q	General Area
0-LGT-247-R036	732.0, C7/q	Req by OPS, PNL 2-M-1
0-LGT-247-R037	732.0, C6/q	Req by OPS, PNL 1-M-6
0-LGT-247-R038	732.0, C6/q	General Area
0-LGT-247-R039	732.0, C5/q	OPS Req, PNL 1-M-5 & 1-M-6
0-LGT-247-R040	732.0, Stair C2	Up/Dn Stairs & Door
0-LGT-247-R041	732.0, C11/n-p	Corridor, Doors C51 & C60
0-LGT-247-R042	732.0, C13/n	General Area
0-LGT-247-R043	732.0, C13/p	General Area
0-LGT-247-R044	732.0, C2/p-q	0-FC0-31A-20,-23, and bulkhead connections to 0-FC0-31C -176,-177

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R045	732.0, C4/n	Corridor, DRS C56 & C39
0-LGT-247-R046	734.0, A12/q-r	General Area
0-LGT-247-R047	734.0, A13s	6.9kV SD BD 1B-B, 2B-B& General Area
0-LGT-247-R048	734.0, A14/q	480V SD BD 2A2-A & General Area
0-LGT-247-R049	734.0, A14/r	480V SD BD 2A1-A
0-LGT-247-R050	734.0, A14/t	480V SD BD 2B1-B
0-LGT-247-R051	734.0, A15/u	2-PCV-1-5 Handwheel & General Area
0-LGT-247-R052	734.0, A13/s-t	480V SD BD 2B2-B & General Area
0-LGT-247-R053	734.0, A12/u	General Area
0-LGT-247-R054	734.0, A11/s	6.9kV SD BD 1B-B, 2B-B
0-LGT-247-R055	734.0, A10/s	6.9kV SD BD 1B-B, 2B-B
0-LGT-247-R056	734.0, A11/r	General Area
0-LGT-247-R057	734.0, A8/r	General Area
0-LGT-247-R058	734.0, A8/q	General Area
0-LGT-247-R059	734.0, A5/r	General Area
0-LGT-247-R060	734.0, A6/s	6.9kV SD BD 1A-A, 2A-A
0-LGT-247-R061	734.0, A5/s	6.9kV SD BD 1A-A, 2A-A
0-LGT-247-R062	734.0, A3/s	6.9kV SD BD 1A-A, 2A-A & General Araa
0-LGT-247-R063	734.0, A3/q	480V SD BD 1B2-B & General Area
0-LGT-247-R064	734.0, A2/r	480V SD BD 1B1-B
0-LGT-247-R065	734.0, A2/t	480V SD BD 1A1-A
0-LGT-247-R066	734.0, A2/u	1-PCV-1-5 Handwheel & General Area
0-LGT-247-R067	734.0, A3/s-t	480V SD BD 1A2-A
0-LGT-247-R068	734.0, A4/u	General Area, CCS PMP C-S Transfer switch via open door

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R069	734.0, A5/u-v	General Area
0-LGT-247-R070	734.0, A4/u	General Area
0-LGT-247-R071	734.0, A3/u-v	General Area
0-LGT-247-R072	734.0, A8/u	General Area
0-LGT-247-R073	734.0, A11/u-v	General Area
0-LGT-247-R074	734.0, A12/v	General Area
0-LGT-247-R075	734.0, A4/q	VBB Rm I - 125VDC Vital Batt Bd 1-I (bkrs on Pnl 2 & rear of Pnl 4) & 120V AC Vital Instrument Power Board 1-I (switch)
0-LGT-247-R076	734.0, A5/q	VBB Rm II - 125VDC Vital Batt Bd 1-II (bkrs on Pnl 2 & rear of Pnl 4) &120VAC Vital Instrument Power Board 1-II (switch)
0-LGT-247-R077	734.0, A2/u	1-PCV-1-30 Handwheel & General Area
0-LGT-247-R078	734.0, A3/q	General Area
0-LGT-247-R079	734.0, A11/q	VBB Rm III - 125VDC Vital Batt. Bd. 1-III (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-III (switch)
0-LGT-247-R080	734.0, A12/q	VBB Rm IV - 125VDC Vital Batt. Bd. 1-IV (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-IV (switch)
0-LGT-247-R081	734.0, A13/u	2-PCV-1-30 Handwheel & Isle behind 480V Shutdown Board 2B2-B
0-LGT-247-R082	734.0, A6/q	PNL 1-L-11A
0-LGT-247-R083	734.0, A6/r	PNL 1-L-11B
0-LGT-247-R084	734.0, A10/q	PNL 2-L-11A
0-LGT-247-R085	734.0, A10/r	PNL 2-L-11B
0-LGT-247-R086	706.0, T2/k	General Area
0-LGT-247-R087	706.0, T8/k-m	General Area
0-LGT-247-R088	706.0, T8/m	Up/Dn Stairwell
0-LGT-247-R089	706.0, Stair C1	Up/Dn Stairs & DooCOMP. ID

LOCATION ILLUMINATED COMPONENTS

0-LGT-247-R090	706.0, Stair C2	Up/Dn Stairs & Door
0-LGT-247-R091	714.0, A12/s	General Area
0-LGT-247-R092	714.0, A8/s	FCV-70-193, -194, -197, -198
0-LGT-247-R093	714.0, A5/s	General Area
0-LGT-247-R094	714.0, A3/t	1-VLV-3-827 & -828 & General Area
0-LGT-247-R095	714.0, A5/t	General Area
0-LGT-247-R096	714.0, A12/t	General Area
0-LGT-247-R097	714.0, Stair A13/u	Up/Dn Stairs & Doors
0-LGT-247-R098	714.0, A13/v	2-VLV-3-835,-834, 2-FCV-3-172,-173
0-LGT-247-R099	714.0, A11/v-w	General Area
0-LGT-247-R100	714.0, A8/v	General Area
0-LGT-247-R101	714.0, A7/w	General Area
0-LGT-247-R102	714.0, A5/v-w	General Area
0-LGT-247-R103	714.0, A3/v	1-VLV-3-835,-834, 1-FCV-3-172,-173
0-LGT-247-R104	714.0, Stair A3/u	Up/Dn Stair & Doors
0-LGT-247-R105	706.0, A2/v	1-LCV-3-175, -174, 1-FCV-1-18
0-LGT-247-R106	706.0, A2/u	General Area
0-LGT-247-R107	714.0, A3/s	1-VLV-3-826,-829
0-LGT-247-R108	714.0, A13/s	2-VLV-3-827,-828 & General Area
0-LGT-247-R109	706.0, A14/u-v	2-FCV-1-18 & General Area
0-LGT-247-R110	706.0, A14/u-v	General Area
0-LGT-247-R111	706.0, A14/v	2-LCV-3-175,-174
0-LGT-247-R112	706.0, A2/u	General Area
0-LGT-247-R113	714.0, A5/w	HSs on JB 3801 & General Area
0-LGT-247-R114	714.0, A10t	1-FCV-67-146, 0-FCV-67-152
0-LGT-247-R115	714.0, A10/s	0-FCV-67-151, 2-FCV-67-146
0-LGT-247-R116	714.0, A12/w	HSs on JB 3804 & General Area
0-LGT-247-R117	706.0, T4/m	Gen Area, Doors C28 & C29
0-LGT-247-R118	706.0, T12/m	Gen Area, Doors C34 & C35
COMP. ID	**LOCATION**	**ILLUMINATED COMPONENTS**

0-LGT-247-R119	706.0, C4/n	Corridor, Doors C30 & C58
0-LGT-247-R120	706.0, C4/p	Gen Area, Doors C29 & C58
0-LGT-247-R121	706.0, C10/n	Door C34 & Gen Area
0-LGT-247-R122	685.0, T5/j	1-VLV-1-868 & General Area
0-LGT-247-R123	685.0, T6/k	Station Air Compressor A & B
0-LGT-247-R124	685.0, T8/k	General Area, 0-33-500, -501
0-LGT-247-R125	685.0, T9/n	Stairwell & General Area
0-LGT-247-R126	685.0, T12/j	2-VLV-1-868 & General Area
0-LGT-247-R127	685.0, Stair C2	Up/Dn Stairs & Door
0-LGT-247-R128	685.0, C7/n	Corridor, Doors C22 & C24
0-LGT-247-R129	685.0, Stair C1	Up/Dn Stairs & Door
0-LGT-247-R130	685.0, C9/n	General Area
0-LGT-247-R131	685.0, C5/n	General Area
0-LGT-247-R132	685.0, T2/k	Stairs, 685.0 to 706.0& General Area
0-LGT-247-R133	685.0, T8/j-k	N-S Aisle between J-K
0-LGT-247-R134	690.0, A1/q	General Area
0-LGT-247-R135	690.0, A2/s	General Area, 0-FCV-67-205, -208, 1-FCV-67-162
0-LGT-247-R136	690.0, A3/t-u	1-FCV-3-116A,-116B, Door A62, 1-FCV-67-164, 1-PI-3-117
0-LGT-247-R137	690.0, A4/s	1-FCV-3-126A,-126B, 1-PI-3-127
0-LGT-247-R138	690.0, A5/s	General Area
0-LGT-247-R139	690.0, A8/t	General Area, 1-FCV-70-153, -156
0-LGT-247-R140	690.0, A10/t	General Area, 2-FCV-70-153, -156
0-LGT-247-R141	690.0, A11/s	General Area, 2-PI-3-117
0-LGT-247-R142	690.0, A13/t	2-FCV-3-126A,-126B, Door A75
0-LGT-247-R143	690.0, A15/v	General Area
0-LGT-247-R144	690.0, A13/u	General Area

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R145	690.0, A13/v	2-LCV-62-132,-133, VCT Rmentrance
0-LGT-247-R146	690.0, A12/v-w	General Area
0-LGT-247-R147	690.0, A9/v	General Area
0-LGT-247-R148	690.0, A4/v	General Area
0-LGT-247-R149	690.0, A3/v	1-LCV-62-132,-133, VCT Rm entrance
0-LGT-247-R150	690.0, A3/u	General Area
0-LGT-247-R151	690.0, A1/v	General Area
0-LGT-247-R152	690.0, A11/w	2-FCV-62-63 & General Area
0-LGT-247-R153	690.0, A11/w	2-FCV-62-77, 2-FCV-70-85,-143 & General Area
0-LGT-247-R154	690.0, A12/t	2-FCV-3-116A, -116B, 2-PI-3-127, 2-FCV-67-217, 219
0-LGT-247-R155	690.0, A5/w	1-FCV-62-63 & General Area
0-LGT-247-R156	690.0, A5/w	1-FCV-62-77, 1-FCV-70-85,-143 & General Area
0-LGT-247-R157	690.0, A4/u	1-VLV-62-692, -693
0-LGT-247-R158	690.0, A12/u	2-VLV-62-692, -693
0-LGT-247-R159	669.0, A4/s	General Area, 1-L-112A
0-LGT-247-R160	669.0, A6/t	General Area
0-LGT-247-R161	669.0, A12/s	General Area
0-LGT-247-R162	669.0, A14/t	2-FCV-3-136A,-136B,179A,-179B, 2-PCV-3-183, 2-PI-3-137, -184
0-LGT-247-R163	669.0, A13/t	General Area, 2-XS-46-57
0-LGT-247-R164	669.0, A13-14/u-v	2-LCV-62-136, Sump Valve Box
0-LGT-247-R165	669.0, A12/u-v	2-VLV-62-537, 538, 539, Sump Valve Box
0-LGT-247-R166	669.0, A13/t	2-VLV-62-526, -527
0-LGT-247-R167	669.0, A11/t-u	2-VLV-62-533, -534
0-LGT-247-R168	669.0, A9/v	General Area

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R169	669.0, A4/u-v	1-VLV-62-537, -538, -539, Sump Valve Box
0-LGT-247-R170	669.0, A2-3/s-t	1-LCV-62-135, -136, & General Area
0-LGT-247-R171	669.0, A1/t	1-FCV-3-136A,-136B,-179A,-179B, 1-VLV-3-918, -919, 1-FCV-1-51 cntrls, 1-PCV-3-183, 1-PI-3-137, -184
0-LGT-247-R172	669.0, A2/t-u	PNL 1-L-381, 1-XS-46-57
0-LGT-247-R173	669.0, A4/u	1-VLV-62-526,-527
0-LGT-247-R174	669.0, A4/u	1-VLV-62-533,-534
0-LGT-247-R175	669.0, A2/u	1-LCV-62-135,-136, Sump Valve Box & General Area
0-LGT-247-R176	669.0, A15/t	PNL 2-L-381
0-LGT-247-R177	669.0, A14/u	2-FCV-1-51 Ctrls, 2-VLV-3-918, -919
0-LGT-247-R178	669.0, A11/s	PNL 2-L-112A, General Area
0-LGT-247-R179	669.0, A13/u	2-LCV-62-135,-136, Sump Valve Box, & General Area
0-LGT-247-R180	653.0, A7/u	General Area
0-LGT-247-R181	653.0, A9/u-v	General Area
0-LGT-247-R182	722.0, Stair D1	Up/Dn Stair & Doors
0-LGT-247-R183	722.0, 722.0-1	General Area
0-LGT-247-R184	722.0, 722.0-2	General Area
0-LGT-247-R185	722.0, 722.0-9	General Area
0-LGT-247-R186	722.0, 722.0-9	General Area
0-LGT-247-R187	722.0, 722.0-9	General Area
0-LGT-247-R188	722.0, 722.0-7	Gen Area, PNL 2-L-163
0-LGT-247-R189	722.0, 722.0-7	General Area
0-LGT-247-R190	722.0, 722.0-6	Gen Area, PNL 1-L-163
0-LGT-247-R191	722.0, 722.0-6	General Area
0-LGT-247-R192	722.0, 722.0-5	Gen Area, PNL 2-L-272
0-LGT-247-R193	722.0, 722.0-5	General Area

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	LOCATION	ILLUMINATED COMPONENTS
0-LGT-247-R194	722.0, 722.0-4	Gen Area, PNL 1-L-272
0-LGT-247-R195	722.0, 722.0-4	General Area
0-LGT-247-R196	740.5, 740.5-1	General Area
0-LGT-247-R197	740.5, 740.5-4	480V BD RM 1A
0-LGT-247-R198	740.5, 740.5-7	480V BD RM 2A
0-LGT-247-R199	740.5, 740.5-10	480V BD RM 1B
0-LGT-247-R200	740.5, 740.5-13	480V BD RM 2B
0-LGT-247-R201	732.0, C10/n	Corridor, Doors C53 & C55
0-LGT-247-R202	749.0, A2/u	1A-A Exh Fan Dampers& General Area
0-LGT-247-R203	749.0, A2-3/s-t	1A-A Exh Fan Dampers& General Area
0-LGT-247-R204	759.0, A12/v	CRDM M-G Set Bkr A&B& General Area
0-LGT-247-R205	714.0, A13/t	2-VLV-3-826 & -829 & General Area
0-LGT-247-R206	759.0, A4/w	PZR Heater Backup Group Distribution Panel & General Area
0-LGT-247-R207	759.0, A11/w	PZR Heater Backup Group Distribution Panel & General Area

1.0 INTRODUCTION

Part VI determines the level of compliance with applicable NFPA codes. The objective is achieved by:

(1) reviewing documentation and plant procedures to determine the location of passive and active fire protection features;

(2) identifying the codes and standards of the National Fire Protection Association (NFPA) to which SQN is committed for the installation of passive and active fire protection features; and

(3) comparing SQN's existing levels and configurations of passive and active fire protection features against the criteria contained within each applicable NFPA code and standard.

Where deviations from the code criteria are identified, justifications for existing configurations to demonstrate equivalent levels of protection may be required. Those code deviations that have a potential impact on the operational capabilities of the specific fire protection feature are identified and justified in Part VII, Section 5 of the FPR. Partial detection and suppression code deviations in locations which require full detection and suppression in order to comply with 10CFR50 Appendix R are identified and justified in Part VII, Section 2 (alternative shutdown requirements in the control building) and Part VII, Section 3 (full detection and suppression evaluations) of the FPR. Those code deviations which do not impact on the operational capabilities of the specific fire protection feature are identified and justified in Section 3.0 of this part. The compliance status of SQN fire protection features against the applicable codes is identified in this Part.

The inspection, testing, maintenance, and training on fire protection features within each code was not reviewed for compliance, however, future changes which are significant in nature and conflict with NFPA requirements in these regards will be addressed in this part Part II, Section 14.0 of the FPR identifies the scope of testing and inspection, and related frequency for regulatory required fire protection systems and features.

2.0 SCOPE

The scope of this evaluation is limited to those fire protection systems or features that are provided for those buildings and areas that contain systems, cables, or components relied on for safety related and fire safe shutdown (FSSD) purposes. This evaluation addresses fire protection systems or features in the reactor buildings, auxiliary building, control building, diesel generator building, turbine building, additional equipment buildings, and intake pumping station.

Other buildings that do not contain systems, components, or cables relied on for safety related and FSSD purposes are not included in the scope of this review.

The scope of the review was to identify the passive and active fire protection features as installed and evaluate the level of compliance with the applicable NFPA codes. Included in this review were automatic detection systems, manual and automatic fixed suppression systems (water-based and carbon dioxide suppression systems), fire doors, fire dampers, manual hose stations, portable extinguishers, exterior hydrants and fire pumps.

The scope of this evaluation was accomplished through a combination of field walkdowns and a review of documentation for references to passive and active fire protection features. Those codes which are referenced in Appendix A to BTP 9.5-1 are covered in this Part, with documentation reviewed and/or field walkdowns performed to evaluate those fire protection features that are relied on for compliance with Appendix A to BTP 9.5-1 and Appendix R to 10CFR50. Documentation reviews and/or field walkdowns were not performed for all applicable codes referenced in Appendix A to BTP 9.5-1. Section 3.3 provides the bases for the level of review and methods of documentation for each applicable NFPA code addressed in this Part.

To establish the level of compliance with the NFPA codes addressed in this Part, plant documentation dealing with fire protection related issues was reviewed. Information on the fire protection features was then reviewed to determine the level of compliance or applicability with the NFPA codes. As a general rule, the appendix of each NFPA code states that it is not a portion of the code and is included for information purposes only. As such, appendices to the codes were not included in the scope of the evaluation. However, where appropriate, the guidance contained in the appendices was utilized to either justify existing configurations or identify additional fire protection features that should be provided.

The code conformance evaluation was conducted by experienced fire protection engineers familiar with the application of NFPA codes and standards to nuclear power plants. Personnel holding Member Grade status in the Society of Fire Protection Engineers were responsible for review of the level of code compliance and preparation of the bases for justification of deviations identified in this Part. The code conformance evaluation was developed and/or reviewed by both engineering and fire operations personnel.

3.0 APPLICABLE NFPA CODES

In order to determine which NFPA codes require review at SQN, NFPA codes listed in Appendix A to BTP 9.5-1 were identified. A total of 30 NFPA codes are specifically identified; however not all the codes are directly applicable to SQN. Codes not applicable to SQN were identified, along with the bases for non-applicability.

3.1 NFPA Codes Not Applicable - General

The following NFPA codes are not applicable to SQN because the code requirements are not directly applicable to the multi-story noncombustible construction structures such as those at SQN:

NFPA 92M-1972	Waterproofing and Draining of Floors (Waterproofing of floors is not required at SQN. Adequate drainage exists as documented in suppression effects calculations.)
NFPA 204-1968,	Smoke and Heat Venting (Smoke and heat venting is covered by pre-fire plans and implemented by the fire brigade. Additionally, plant operating procedures further support the operation of systems utilized in smoke and heat venting activities. NFPA 204 was applicable to single story structures and has been superseded by NFPA 204M.)

The following NFPA codes are considered not applicable to SQN because the codes provide general guidance on training and organization of fire brigades and guidance on fire loss prevention, some of which have also been superseded by new codes:

NFPA 4-1977	Organization for Fire Services
NFPA 4A-1969	Fire Department Organization
NFPA 6-1974	Recommendations for Organization of Industrial Fire Loss Prevention
NFPA 7-1974	Recommendations for Management Control of Fire Emergencies
NFPA 8-1974	Recommendations for Management Responsibility for Effects of Fire on Operations
NFPA 27-1975	Private Fire Brigades
NFPA 197-1966	Initial Fire Attack, Training, Standard On
NFPA 601-1975	Guard Service in Fire Loss Prevention

The training and organization of the SQN fire brigade is identified in detail in Part II of the FPR, thereby demonstrating proper training and organization of onsite fire fighting capabilities.

3.2 NFPA Codes Not Applicable Site-Specific Fire Protection Features

A number of NFPA codes that are typically applicable to nuclear power plants are not applicable based on site-specific methods for implementation of fire protection features. In most cases, existing fire protection features were identified and evaluated for the level of protection afforded by the fire protection feature. This approach was applicable to specific features with code requirements that did not readily lend themselves to an in-depth code evaluation. Compliance with code criteria is only provided to the extent identified below for the existing fire protection features.

3.2.1 NFPA 10-1975: Portable Fire Extinguisher

Portable extinguishers are not installed in accordance with the spacing and location criteria nor inspected at the specified frequency of NFPA 10. Portable extinguishers are provided solely for the use by personnel trained in their use. Fire brigade members and hot work fire watches receive hands-on training in use of portable extinguishers. Fire brigade members are also cognizant of the location of extinguishers for fire fighting purposes through the extinguisher inspection program and pre-fire plans. The experience history was used as a base for an inspection frequency of quarterly. Refer to Part II, Section 14.0 of this FPR for more information.

3.2.2 NFPA 11B-1977: Foam-Water Sprinkler Systems

NFPA 11B is not applicable because foam-water sprinkler systems are not located in plant buildings that contain systems, components, or cables relied on for fire safe shutdown.

3.2.3 NFPA 12A and 12B: Halon 1301 and 1211 Extinguishing Systems

NFPA 12A and NFPA 12B are not applicable because these systems are not located in plant buildings that contain systems, components, or cables relied on for fire safe shutdown.

3.2.4 NFPA 25-1993: Water System Tests

NFPA 25 is not a code of record at SQN for any specific fire protection feature test and inspection requirement.

3.2.5 NFPA 26-1958: Valve Supervision

SQN's method of ensuring valve position is identified in Part II of the FPR. Valve positions are inspected in accordance with plant procedures.

3.2.6 NFPA 49-1975: Hazardous Chemical Reactions

Hazardous chemical reaction code criteria are only applicable to the storage and handling of chemicals by the chemistry department. Administrative procedures govern hazardous chemical use. The criteria of NFPA 49 has no impact on the fire safe shutdown conformance program and was therefore not reviewed.

3.2.7 NFPA 50A-1973: Gaseous Hydrogen Systems

Hydrogen is supplied to the volume control tanks (VCT) through seismically qualified piping from the exterior wall of the auxiliary building to the VCTs. The piping is seismically designed for pressure boundary retention between the VCTs and the isolation valves adjacent to the tanks. The remainder of the piping in the Auxiliary Building is seismically supported but not designed for pressure boundary retention. Two isolation valves are installed on the hydrogen supply line on the exterior wall of the Auxiliary Building that are designed to close automatically on high hydrogen flow rate in the downstream piping.

3.2.8 NFPA 51-1975: Oxygen Fuel Gas Systems for Welding and Cutting

NFPA 51 is applicable to large manifolded oxygen fuel gas systems and the use of oxy-acetylene cylinders for cutting and welding activities. Large manifolded systems are not used at SQN. The use of oxy-acetylene cylinders is controlled through the approval and control of ignition source activities and is discussed in NFPA 51B.

3.2.9 NFPA 90A-1975: Air Conditioning and Ventilation Systems

The heating, venting and air conditioning (HVAC) systems at SQN are not designed to NFPA 90A. The HVAC systems are designed as described in FSAR chapters 3, 6 and 9. The required locations for fire dampers were reviewed by a comparison of HVAC duct locations and the locations of regulatory fire barriers. Specific HVAC penetrations through regulatory fire barriers without fire dampers are addressed in Part VII of the FPR. Damper closure under air flow conditions are addressed by shutting off HVAC fans where necessary. Justification for sealing thermal expansion gaps between the ductwork and the barrier is provided by fire test documentation. Access to fire dampers is usually provided by access doors. However, in some cases, bolted connection duct sections require removal for access to fire dampers.

3.2.10 NFPA 251: Fire Tests of Building Materials

The fire rating of walls and floor/ceiling assemblies is based on a comparison with typical UL designs as documented in Part II of the FPR. The fire rating of raceway fire barrier materials is addressed under a separate program that has been reviewed in detail by the NRC. There are no other claims regarding SQN's level of compliance with NFPA 251.

3.3 Applicable NFPA Codes Reviewed in Detail for Compliance

The remaining NFPA codes referenced in Appendix A to BTP 9.5-1 are applicable and relied on to establish compliance with fire safe shutdown regulations and guidance documents. Detailed code evaluations were conducted on the applicable sections of these codes to identify code requirements. Sections on the code that are not applicable to SQN are not discussed in the following evaluations. Documentation was reviewed and field investigations were conducted in order to establish the level of compliance with code requirements.

The following list identifies the codes, along with the year of the edition, which were used to evaluate the adequacy of existing fire protection features against code requirements:

3.3.1	NFPA 12-1973	Carbon Dioxide Systems (Chapter 1 & 2)
3.3.2	NFPA 13-1975[1]	Automatic Sprinkler Systems (refer to Part VII)
3.3.3	NFPA 14-1974	Standpipe and Hose Systems (Chapters 1-7)
3.3.4	NFPA 15-1973	Water Spray FixedSystems for Fire Protection
3.3.5	NFPA 20-1973 & NFPA 20-1993	Centrifugal Fire Pumps[2]
3.3.6	NFPA 24-1973	Outside Protection

[1]NFPA 13-1987 is theCOR for the wet pipe sprinkler systems installed in the Turbine Building.

[2]NFPA 20-1993 will be theCOR for the new fire pump installation.

3.3.7	NFPA 30-1973	Flammable and Combustible Liquids Code (Chapter 4 & 5)
3.3.8	NFPA 51B-1976	Cutting and Welding Processes
3.3.9	NFPA 69-1973	Explosion Prevention Systems
3.3.10	NFPA 72D-1975	Proprietary Protective Signaling Systems
3.3.11	NFPA 72E-1974	Automatic Fire Detectors (All)
3.3.12	NFPA 80-1981	Fire Doors and Windows (All)
3.3.13	NFPA 194-1974 & NFPA 196-1974	Fire Hose Connectors (All) and Fire Hose (All)

Note that TVA is typically the designer, installer, operator, maintainer, owner and also that the Corporate Engineering, Chief Engineer serves as the Authority Having Jurisdiction (AHJ). For many fundamental NFPA code requirements, the TVA design process, construction specifications, operating and maintenance instructions, drawing control and approval process for nuclear plants take precedence (e.g., drawing preparation and format, calculation preparation and format, etc.).

A summary description of code compliance is provided for each of the above codes.

3.3.1 NFPA 12-1973: "Carbon Dioxide Systems"

NFPA 12-1973 is the Code of Record (COR) for SQN CO_2 systems. The CO_2 systems at SQN are identified as System 39 and are installed in selected areas for protection of safety-related and non-safety-related equipment. SQN is in general compliance with NFPA-12-1973. Operation of the CO_2 fire protection system is not required for safe shutdown. Safe shutdown is provided by Appendix R III.G and III.L separation in conjunction with fire detection, automatic sprinklers and electrical raceway fire barrier systems. Therefore NFPA 12-1973 will not be reviewed in detail for compliance.

3.3.2 NFPA 13-1975: Automatic Sprinkler Systems

This is the COR applicable to pre-action and deluge system installed in safety related areas at SQN. SQN has non-safety-related under deck wet pipe sprinkler systems installed in the turbine building. The turbine building wet pipe sprinkler systems were designed/and installed to NFPA 13 (1987) and American Nuclear Insurer Requirements. Preaction and deluge systems are operated and maintained in accordance with approved operating and maintenance procedures. Preoperational, post-modification and periodic surveillance tests (except main drain test) ensure system operational status. Fire pumps are addressed under NFPA-20. Piping is supported per TVA seismic design requirements. Drain lines are fitted with hose connections to facilitate drainage. Risers are not equipped with flanged joints at each floor due to other factors affecting the sprinkler system design in a nuclear plant environment. The sprinkler systems are typically hydraulically designed. Valves that are required to be locked and/or sealed in a required position are verified periodically to be locked and/or sealed. Typically, all sprinkler flow control valves are supplied by water from two directions with section isolation valves used in lieu of check valves (except inside containment). Fire department connections are not provided for sprinkler systems serving nuclear safety related areas. Valves are typically numbered and identified on configuration controlled drawings and name tags in the field.

Literal code conformance for the exact location and spacing of sprinkler heads is not always achievable due to congestion (e.g., tray, conduit, and pipe supports). Extensive sprinkler system walkdowns were conducted as part of the Appendix R reevaluation. The spacing and location of sprinklers, branch lines, sprinkler spray patterns, and types of sprinklers are addressed in the sprinkler design packages and sprinkler walk downs done for compliance with Appendix R intervening combustibles and to address major obstructions. In plant areas required for spatial separation with intervening combustibles, the sprinklers were modified to comply with the intervening combustible sprinkler system criteria. Sprinklers under ducts, decks, galleries, and open gratings over 4 feet wide are typically provided when required by the intervening combustible deviation criteria. See Part VII of the FPR. In other areas, the sprinkler systems have been designed to meet the general intent of the code, however, deviations from the code requirements do exists.

Nonenclosed or unprotected elevators, stairs, and shafts are not provided with water curtains and draft stops except between where required for separation of safe shutdown equipment. See Part X and VII of this FPR.

Seismic piping design and spray shields are provided on select sprinkler systems when necessary to protect at least one train of safe shutdown equipment from damage due to inadvertent spray.

Pressure gages are installed above and below preaction valves; however, they do not serve an operation function. Hydraulically designed sprinkler system calculations are performed in accordance with TVA Nuclear Engineering Procedure (NEP) 3.1 Calculations. Information is documented on a combination of drawings (flow, isometric, pipe layout) and calculations.

Strainers are typically provided in the supply to each preaction valve. Flushing connections are not provided. Auxiliary drains for trapped water in piping are provided in lieu of 2 valves and 2" nipples.

See Part VII of this FPR for additional evaluations (i.e. bushings, etc.).

3.3.3 NFPA 14-1974: Standpipe and Hose Systems

This code applies to piping, valves, hoses and fire nozzles installed in the interior of safety related structures for the purpose of manual fire fighting. Interior hose systems are 1 1/2" and designed for 100 gpm. These hose stations do not meet literal compliance with the code. Supply piping may be < 4" in some cases. Some standpipes have > 100' of hose attached. Hose stations are located in or near the enclosed stairways of the control building. Main riser valves are not all post indicator types. Hose connections are 2 1/2 " diameter on the roof of safety-related structures. Branch lines serving more than one hose station do not always have isolation valves.

Fire department connections are not provided for standpipe/hose systems serving nuclear safety related areas.

SQN provides hose stations for fire brigade use as discussed in Part II, Section 9.0. Plant personnel are instructed in General Employee Training to not use such equipment unless they are trained in its use. Fire brigade personnel are adequately trained in the use of the hose stations.

Approved hose valves are used at each outlet. The fire brigade is trained in the use of fire hose where pressures in excess of 100 psi can be experienced. The fire hose is maintained to accommodate these higher pressures. Therefore, the pressure reducing devices are not required.

Standpipes in auxiliary and control buildings are interconnected to the buildings internal HPFP loop, but not necessarily at the lowest elevation.

Indicating and check valves at connections to water supplies are not always provided. Standpipes can be isolated by system 26 (HPFP system) valves in the piping network. Check valves to prevent back flow are not warranted.

High pressure valves are not used, even though system spikes in excess of design pressure can occur due to pump start surges before relief devices compensate. This is acceptable and in accordance with the systems ANSI B31.1 requirements.

Listed materials are used and the piping can withstand working pressure of system. Piping is in accordance with ANSI B31.1 material requirements.

Valves of approved indicating type are not provided at main riser in all cases Sprinkler systems can be isolated and not preclude ability to provide hose stream coverage.

Water supply control valves to standpipes are not post indicating type.

The supply valves are under administrative controls (e.g., locking or sealing the valve in position, and strict control of work) and the access restriction to trained and qualified personnel provides adequate assurance that the valves are in the proper position.

The tops of each standpipe do not have a 3 1/2 inch dial spring pressure gage.

Activation of push button stations in the Unit 1 and Unit 2 annulus and lower containment will cause an alarm to be annunciated in the MCR fire detection alarm console. Flow alarms are not provided on all standpipes. As previously stated, the hose stations are provided for trained fire brigade personnel. Other site personnel are trained to report fires. After reporting a fire an individual may attempt to extinguish the fire only if he/she has been trained in the use of fire fighting equipment (see part II, Section 7.8). Adequate notification of standpipe operation will therefore be communicated to the Main Control Room.

3.3.4 NFPA 15-1973: Water Spray Fixed Systems for Fire Protection

Four distinct types of water spray fixed systems for fire protection are used to protect special hazards in safety related areas. The hazards protected are unique to a nuclear power plant and therefore direct code application and compliance is beyond the scope of NFPA 15 in respect to the overall goals of the National Fire Codes. However, NFPA 15-1975 forms the design basis of the water spray systems. Listed below is a synopsis of each system and the key application of NFPA 15.

3.3.4.1 Reactor Coolant Pumps (RCP)

Each of the four RCPs are protected by a closed head, automatic pre-action water spray fixed system. Listed nozzles are located around the top of the RCP motor along a ring header. The systems are hydraulically designed in accordance with NFPA 13 & 15 and produce a minimum design density of 0.25 gpm/ft^2. This density corresponds to NFPA 15 requirement for transformer protection (oil hazard). The pre-action system is automatically actuated upon initiation of cross zoned thermal detectors located above the motor.

3.3.4.2 Charcoal Filters

Closed head, automatic pre-action water spray fixed systems are provided for the Control Room Emergency Air Cleanup (CREAC), Containment Purge Air Exhaust System (CPAES), Emergency Gas Treatment System (EGTS), and the Auxiliary Building Gas Treatment System (ABGTS). The use of water spray fixed systems for protection of charcoal filters is the only type of suppression system recognized by NFPA 803-1983 (Table 10-1.2). The systems are hydraulically designed in accordance with NFPA 13 & 15 and produce a minimum design density of 0.25 gpm/ft^2 across the surface of the exposed filters

In accordance with NFPA 15, Section 4-4.1.2, a design density was determined for this unique application based on analysis of the combustibles. The flow density of 0.25 gpm/ft^2 corresponds to the flow density specified in Section 5-4.6.1 of NFPA 850, "Recommended Practice for Fire Protection for Fossil Fueled Steam Electric Generating Plants" for sprinklers provided for coal handling structures subject to accumulations of coal or coal dust. Charcoal filters have a lower heat energy value (i.e., Btu/volume) than coal (based on lesser density and chemistry of the material). The flow density of 0.20 gpm/ft^2 over the plan area for bag-type dust collectors (in coal handling facilities) is adequate for the hazard. Therefore the use of 0.25 gpm/ft^2 for the charcoal is conservative.

The temperatures for the fusible elements in the spray nozzles was determined by correlating the maximum temperature expected in the filter units to the recommendations of NFPA 13, Table 2-2.3.1, "Temperature Ratings, Classifications and Color Codings."

In the event of a charcoal fire in the ABGTS, EGTS, CREAC or CPAES filter units, the thermal/smoke detectors will annunciate the alarm and trip the spray system's deluge valve, allowing water up to the closed nozzles. After shutdown of the fan and closure of the downstream damper, the heat will build inside the unit. This will ensure operation of the thermal elements in the nozzles if they have not previously been activated by the fire.

The Post Accident Sampling System (PASS) charcoal filter is furnished with a manually actuated open head fire suppression system connection which is designed for a 12 gpm flow rate at 65 psig in the High Pressure Fire Protection (HPFP) water supply at the charcoal filter header. The PASS charcoal filter fire protection system will be manually actuated in the event of a fire in the charcoal unit. This will preclude the possibility of inadvertent actuation and subsequent wetting of the charcoal. Automatic detection is not considered warranted for this specific installation in the PASF filters. A manually actuated valve is used. These filters see very limited use (short periods only after an accident), unlike the other systems which would probably be used continuously during a radiological emergency. The heavy duty air tight construction of the filter system enclosure would likely contain a charcoal fire (charcoal used in this manner typically does not produce flaming combustion, but rather smolders) and there are no significant quantities of combustibles located near the filter enclosures. As secondary protection to the enclosure, the room the PASF filter enclosures are contained in is provided with automatic detection. Manual standpipe hose stations are available for exterior application, if needed.

3.3.4.3 Reactor Building Containment Annulus Cable Interactions

An automatic, pre-action sprinkler system, utilizing standard upright sprinkler heads, provides a unique application of a water spray fixed system in the reactor building containment annulus. Section III.G.2.e of 10CFR50 Appendix R, allows the use of "fire detectors and an automatic fire suppression system in the fire area" as one of the means of providing fire protection of safe shutdown capability inside a non-inerted containment.

3.3.4.4 Cable Tray Water Spray Systems

Two open head water spray systems are installed to protect the (1) Train A cable trays in the 480v shutdown board room 1B2-B and (2) Train B cable trays in the 480v Shutdown Board Room 2A2-A. Each system is actuated by line type thermal detectors located at the top and bottom of the protected stack of trays crossed zoned with smoke detectors.

3.3.5 NFPA 20-1973 & 1993: Centrifugal Fire Pumps

The potable water supplied HPFP pumps are a standard fire pump design from a fire pump manufacturer and meets all the requirements of NFPA-20, 1993. Refer to Part II for a description of the fire pumps.

3.3.6 NFPA 24-1973: Outside Protection

The code applies to yard piping supplying, hydrants, sprinklers, hose stations, etc. The system 26 (high pressure fire protection system) flow diagrams are under configuration control and maintained in the Main Control Room. This clearly complies with the intent of the code (as applicable to a nuclear plant). SQN does not rely on the public water system for pressure/capacity. Adequate water supply is determined by flow test. Yard mains are of ample size. No pressure regulating valves used in the main process water supply flowpath. Pressure control valves are used similar to relief valves to control over pressure conditions. Automatic pump start is described in Part II.

The HPFP system is a dedicated potable water system. Water for the fire pump storage tanks is supplied by the municipal utility. The HPFP system is normally pressurized when the fire pumps are not running by a cross connect to the fire tank potable water supply and two jockey pumps which automatically start if the potable water supply cannot maintain system header pressure. The cross connect is downstream of the potable water backflow preventer and contains a pressure regulator and check valve to isolate the fire protection system from a failure of the potable water supply and prevent recirculation back to the fire tanks during fire pump operation.

The two 8" carbon steel headers from the IPS to the AB and ERCW station are not lined. These headers serve as nuclear safety-related supplies to the Steam Generators during flood mode operations.

Fire department connections are not used for safety related areas (approved by AHJ). Both indicating and non-indicating valves are used in the HPFP system. Check valves are in accordance with approved material (e.g., ANSI B31.1).

Post indicating valves (PIV) are not installed in all required locations. Some PIVs are not located exactly 36" above the ground level (grade), but are accessible for proper operation. Break-away locks or seals are used on fire protection system valves to administratively control their position. Inspection of valve positions are performed at the frequency specified in Part II, Section 14.0.

The requirement for hose houses and equipment criteria is met by mobile apparatus and/or hose houses. Couplings are of same size and thread, and are interchangeable with those of the local fire department. Nozzles are of the approved type. Selection, coating and lining, and fitting of joints for piping is per TVA design, construction, and modification procedures. These procedures provide guidance that meets or exceeds the code. A loop system is provided for systems in the DGB, CB, AB, and RBs. Minimum size of underground pipe is 6 inches except for the 4" supply to the DGB.

3.3.7 NFPA 30-1973: Flammable and Combustible Liquids

NFPA 30-1973 was only evaluated for storage and transport of combustible materials (Chapters 4 & 5). SQN is in general compliance with the intent of applicable sections of chapters 4 and 5 (i.e., approved containers, size, storage cabinets, tanks, closed containers, covered containers, fire extinguishers, repairs and housekeeping, etc.).

3.3.8 NFPA 51B-1976: Cutting and Welding Processes

The use of ignition sources such as welding, flame cutting, thermite welding, thawing pipe brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of a permit. TVA adequately addresses the primary functional requirements of NFPA 51B through the implementation of administrative controls, permits that are reviewed and approved by appropriate plant personnel, and the use of fire watches for ignition source work activities in safety-related areas of the plant. Refer to Part II, Section 11.0 for more details.

Designated smoking areas are located outside of building structures.

3.3.9 NFPA 69-1973: Explosion Prevention Systems

NFPA 69 is applicable only to the battery rooms. The exhaust air system for these areas is designed to limit the potential build-up of hydrogen gas to less than 2%. The systems as installed meet the intent of the code; however, there are no means to control and monitor the combustible gas concentration.

3.3.10 NFPA 72D-1975: Proprietary Protective Signaling System

NFPA 72D-1975 applies to TVA System 13. The system is typically a "Class A" supervised system. The central supervising station is located in the Main Control Room which is a security area with strict access control. The system is arranged to receive and record all signals, and a direct supervised circuit to local fire department is not deemed necessary. The fire alarm console in the Main Control Room is a UL listed device designed by Pyrotronics, Inc. The audible alarm levels have been adjusted to meet the requirements of the human factors analysis for the MCR. All plant areas do not have audible signals that can be heard above background.

An exception to SQN General Engineering Specification, G-73 R5, "Installation, Modification and Maintenance of Fire Protection Systems and Features," has been implemented to allow the bypassing of the Main Control Room (MCR) audible indicating appliance when a dedicated operator is stationed at the console. NFPA 72D does not address situations in which the alarm device is located in an area in which many audible devices are relied upon to provide continuous monitoring of other plant systems, in addition to the fire protection system. Numerous audible alarms result in a significant distraction to the MCR Operators, who are monitoring other sensitive and safety-related plant equipment. Therefore, an allowance has been implemented to silence, muffle, or mute the audible portion of the indicating appliance based on the contingency that the annunciation may only be altered when an operator has been designated to monitor the console continuously until the normal annunciation system is restored. If the console is to be unattended by a dedicated operator, the audible alarm is to be returned to the normal configuration. Applicable plant procedures provide these specifications.

Access to the "central supervising station" (Main Control Room) is not limited to only those personnel required to operate the system. Site security procedures ensures strict access control for personnel who can be on site and further restricts access to the Main Control Room. Areas in the Main Control Room that involve control functions of the plant, have additional access restrictions applied. The combination of these controls ensure the proper operation of and response to the "central supervising station".

Operation and supervision of the fire alarm station is not the only safety function of the Main Control Room operators. They are responsible for all MCR alarm response functions.

Upon receipt of a selected low threshold fire alarm signal, the fire brigade is not immediately activated. Upon receipt of an alarm from a cross zone detection system, an individual is dispatched to the area to determine cause of alarm. If a fire exists, the individual notifies the Main Control Room and they in turn notify the fire brigade. If both zones of a cross zoned detection system alarm, the fire brigade is notified immediately. Non-cross zoned detector alarms are investigated. This allows alarms to be addressed at a proper level while still maintaining a rapid response by fire brigade to actual fires.

System is rated to operate at 120v +/- 10v and 60 +/-2 cycles. System is nominal 120V.

Water flow actuated devices and transmitters are not being tested every two months. Water flow through the test connection is not performed. A main drain test is not performed after operation of a system isolation control valve. See Section 3.2.2 of Part VI.

The alarm power and trouble power for the local panels come from the same power panel, but from different circuit breakers. The same primary and secondary power supplies power both alarm and trouble circuits. The power service connection and overcurrent protective devices are not in locked panels; however, access to panels is under operations control.

A distinctive signal is used for the central console alarm; however, console alarm signals may not take priority over all other control room signals. Priority is determined by the licensed operators.

Primary and secondary power supply is not within the control room; they are provided for the fire alarm console from offsite and onsite power sources. The fire alarm system has the emergency diesel generators as the automatic secondary power supply. Emergency diesel generators (DG) are not reviewed against NFPA 37, and the DGs are not operated weekly (they are designed, tested, and operated based on FSAR regulatory guide, and Technical Specification requirements with the intent of ensuring the supply is met).

Signal attachments and circuits (pressure switches) can be removed or tampered with and not cause an alarm. The site personnel access control and the work control system provide adequate assurance that work on such devices are properly controlled and documented. Therefore, there is not a need for such alarms as would be in areas accessible to the general public where tampering is a concern.

Releasing circuits for CO_2, sprinkler and spray systems are typically not supervised.

Sprinkler system control valves are not electrically supervised, but are locked or sealed open and periodically inspected. Administrative controls (e.g., locking or sealing the valve in position, and strict site access and work control) for valve manipulation assures that the valve has not been tampered with and is in the proper position.

Both visual and recorded displays are in compliance, but records are not preserved for later inspection. Plant procedures have reporting requirements for conditions adverse to quality. These procedures require that an adverse condition report be initiated when the problem was identified. Printouts can be provided by the fire alarm console to support the adverse condition report and aid in the reconstruction of a sequence of events to meet the intent of the code.

3.3.11 NFPA 72E-1974: Automatic Fire Detectors

Specific areas may not have fire detectors installed. See Part X and VII for specifics. The literal requirement of fire detectors spacing may not have been met in all cases; however the intent is met by providing detectors commensurate with the hazard.

Smoke detectors in the high ceiling areas are not installed alternately on two levels. In general, high ceilings are addressed by reduced spacing of detectors at ceiling level as opposed to two levels of detectors. This is acceptable because stratification is not a concern because of the HVAC mixing of the air and/or the low combustible loading of the area. The spacing of detectors on the refuel floor does not meet code requirements. The existing detectors in conjunction with the room size, ceiling height, combustible loading, and special separation provide a reasonable level of fire protection. (see Part VII. Section 2.1).

Use of the duct detectors in lieu of area detectors is provided for the Reactor Building upper and lower compartment coolers. Regulatory requirements for detectors are met in the Reactor Building. Duct detectors are used to address the cooler hazard. Thermal detectors are used to address the RCP motor hazard.

Duct detectors are not provided per NFPA 90A requirements; fans that service area of the fire are manually shut down when necessary to ensure that air flow will not prevent fire dampers from closing.

Periodic testing of smoke and restorable heat detectors is conducted annually instead of semiannually. This is based on the reliability of the fire detectors and an evaluation of the deviation's impact on the ability to achieve and maintain plant shutdown in the event of a fire.

3.3.12 NFPA 80-1981: Fire Doors and Windows

A summary door evaluation list was utilized to review fire doors per NFPA 80. As noted on the compartmentation drawings in Part X of the FPR, evaluations have been performed by TVA or nationally recognized laboratories on those fire door assemblies that are not listed or labeled as fire rated door assemblies. TVA has ensured that the hardware and other components of fire door assemblies comply with NFPA 80 requirements or are appropriately evaluated. Specific attachments to fire doors, such as for security hardware, do not adversely impact on the fire rating of fire door assemblies as identified in Generic Letter 86-10. The quantity and location of fusible links on rolling/sliding fire doors is dependent on the fire hazards and other fire protection features provided (i.e. some doors may have only one link vs the code required three when combined with fire detection/suppression and/or low combustible loadings). See Part VII.

3.3.13 NFPA 194-1974: Fire Hose Connectors: NFPA 196-1974: Fire Hose

Fire Hose Connectors (NFPA 194) and Fire Hose (NFPA 196) address the acceptable connectors and materials for fire hose assemblies. Fire hoses and their connectors are visually inspected. Fire hose and connectors are expendable items. Replacement parts are purchased to the current standards at the time of purchase.

ONP
DDSBP011

PROCEDURE AND INSTRUCTION CONTROL
TRANSMITTAL/RECEIPT ACKNOWLEDGMENT (TRA)

TO: SMITH, J.D.
ADDRESS: OPS 4C-SQN

HOLDER #: 001741 DCRM SQNP
TRANSMITTAL NO: 020001472
TRANSMITTAL DATE: 03/12/02

SEE ATTACHED FILING INSTRUCTIONS

INFORMATION ONLY

DCRM (D)	MANUAL	DOCUMENT NUMBER	REV DATE	REV LEVEL
SQNP	FPR	FPR IC#ADD EFF DATE TO C. SHEET	031102	11

STATUS: ACTIVE COPY # 001

AS THE ASSIGNED DOCUMENT HOLDER FOR THE ABOVE CONTROLLED COPY NUMBER, YOU ARE RESPONSIBLE FOR FILING AND FOR MAINTAINING THESE DOCUMENTS. RECEIPT ACKNOWLEDGMENT IS NOT REQUIRED.

TVA 40183(NP 5/90)

SQNP020001472

TVAN FIRE PROTECTION REPORT APPROVAL PAGE

SEQUOYAH NUCLEAR PLANT
FIRE PROTECTION REPORT

Revision No. 11
Effective Date: 3/11/2002

Revision Sponsor:

SE-M/N	Brenda Simril
Organization	*Name*

Change Approval

REF #.	Organization	Action Needed?	Type of Action	Impacts (see note 1)	Action Complete (Name / Signature)		Date
1	SE - M/N	N/A	Change Initiator	N/A	*via Curator (B.F. Simril)*	*via Curator*	
2	SE - M/N Program Owner	Yes	T & I Reviews [3]	Yes ☐ No ☒	*via Curator (Brenda Simril)*	*via Curator*	
3	SE - EE Program Owner	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (E. H. Turner)*	*via Curator*	
4	OPS Procedures	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (D. Porter)*	*via Curator*	
5	OPS Fire Protection	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (D. C. Johnson)*	*via Curator*	
6	OPS FP System Engineer	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (R. C. Egli)*	*via Curator*	
7	OPS FP System Engineer	Note 4	T & I Reviews [2]	Yes ☒ No ☐	*via Curator (S. Frazier)*	*via Curator*	
8	N/A	Note 3	Impact Review	Yes ☐ No ☒	*N/A*	*N/A*	*N/A*
9	PORC Chairman (Meeting #6044)	Yes	Approval	N/A			
10	Plant Manager	Yes	Approval	N/A			

1. Record any impacts of the FPR change on form FPDP-3-2, TVAN FPR Revision Impacts
2. Technical review of the FPR change and also impact review if change is outside the design change process.
3 Additional impact reviews - as determined needed by sponsor or technical reviewers. N/A rows not needed.
4. If more than one system/system engineer is affected by the change.

ONP
DDSBP011

PROCEDURE AND INSTRUCTION CONTROL
TRANSMITTAL/RECEIPT ACKNOWLEDGMENT (TRA)

TO: SMITH, J.D.
ADDRESS: OPS 4C-SQN

HOLDER #: 001741 DCRM SQNP
TRANSMITTAL NO: 020001418
TRANSMITTAL DATE: 03/11/02

SEE ATTACHED FILING INSTRUCTIONS

INFORMATION ONLY

DCRM (D)	MANUAL	DOCUMENT NUMBER	REV DATE	REV LEVEL
SQNP	FPR	FPR	031102	11

IC#COVERSHEET R11 03/11/02
IC#PART-II, R11 03/11/02
IC#PART-III, R10 03/11/02
IC#PART-V, R10 03/11/02
IC#PART-VII, R6 03/11/02
IC#PART-VIII, R5 03/11/02
IC#REV LOG R11 03/11/02
IC#TOC R11 03/11/02

STATUS: ACTIVE COPY # 001

AS THE ASSIGNED DOCUMENT HOLDER FOR THE ABOVE CONTROLLED COPY NUMBER, YOU ARE RESPONSIBLE FOR FILING AND FOR MAINTAINING THESE DOCUMENTS. RECEIPT ACKNOWLEDGMENT IS NOT REQUIRED.

NRC
PKG

COPY PLACED IN
BOOK
JB
4-30-02

TVA 40183(NP 5/90)

TVAN FIRE PROTECTION REPORT APPROVAL PAGE

SEQUOYAH NUCLEAR PLANT
FIRE PROTECTION REPORT

Revision No. 11
Effective Date:

Revision Sponsor:

SE-M/N	Brenda Simril
Organization	*Name*

Change Approval

REF #.	Organization	Action Needed?	Type of Action	Impacts (see note 1)	Action Complete (Name / Signature)		Date
1	SE - M/N	N/A	Change Initiator	N/A	*via Curator (B.F. Simril)*	*via Curator*	
2	SE - M/N Program Owner	Yes	T & I Reviews [3]	Yes ☐ No ☒	*via Curator (Brenda Simril)*	*via Curator*	
3	SE - EE Program Owner	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (E. H. Turner)*	*via Curator*	
4	OPS Procedures	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (D. Porter)*	*via Curator*	
5	OPS Fire Protection	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (D. C. Johnson)*	*via Curator*	
6	OPS FP System Engineer	Yes	T & I Reviews [2]	Yes ☐ No ☒	*via Curator (R. C. Egli)*	*via Curator*	
7	OPS FP System Engineer	Note 4	T & I Reviews [2]	Yes ☒ No ☐	*via Curator (S. Frazier)*	*via Curator*	
8	N/A	Note 3	Impact Review	Yes ☐ No ☒	*N/A*	*N/A*	*N/A*
9	PORC Chairman (Meeting #6044)	Yes	Approval	N/A			
10	Plant Manager	Yes	Approval	N/A			

1. Record any impacts of the FPR change on form FPDP-3-2, TVAN FPR Revision Impacts
2. Technical review of the FPR change and also impact review if change is outside the design change process.
3. Additional impact reviews - as determined needed by sponsor or technical reviewers. N/A rows not needed.
4. If more than one system/system engineer is affected by the change.

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	Initial Issue	8/23/96
1	Revision 1 to the Fire Protection Report (FPR) is a complete revision of the document. The previously issued change packages (FPR-01-1 thru -13) have all been incorporated and interfiled with this revision. These change packages have been approved by PORC independently. Besides minor editorial changes (e.g., correction of typographical errors, clarification of wording, etc.), the only new change to the FPR is to Part II, Section 14, in which the surveillance requirements (SR) for hose station inspections and valve position verification of valves in the Reactor Buildings have been revised. Also, a new SR has been added for valve actuation of hose station standpipe valves. All significant changes made by Revision 1 (e.g., change package revisions, the above mentioned surveillance requirements, etc.) are designated by revision bars.	11/19/98
2	Revision 2 to the FPR is to incorporate Fire Detection Zones 547 and 548 into Part II, Table 3.3-11. These zones are being added by DCN M-14226-A, which is installing automatic fire suppression and detection into the general area of Elevation 690.0, above the Boric Acid Tanks. Pages Changed: Coversheet, i, ii, iii, II-48 Pages Added: II-67 Pages Deleted: None Note: Sections with page(s) affected by this change are being included in their entirety and issued with this change package. Therefore, the entire sections will be issued as Rev. 2, with the specific changes denoted by revision bars.	12/17/98

Revision No.	DESCRIPTION OF REVISION	Date Approved
3	Revision 3 to the FPR affects Part VII and Part II, Sections 5.0 and 14.0. For continuity and consistency in pagination, the sections are being issued in their entirety as Rev. 3, with the actual changes denoted by revision bars. The changes to Part VII of the FPR were made as part of the corrective action plan for resolution of CAQ SQ962075PER. The PER was originally initiated due to a discrepancy between actual plant configuration and the justification for an NRC approved deviation to 10CFR50 Appendix R. The changes made in Rev. 3 of the FPR include resolution of documentation discrepancies involving combustible loading values, updates of cable rerouting, raceway barrier installations, procedure changes, etc. The nature of the discrepancies were all documentation only, and did not represent any unanalyzed configurations in the plant. Also, minor changes to existing evaluations in Part VII were done as enhancements. Changes to Part II of the FPR included the addition of the definition of "In-situ Combustible Loading," and the allowance for exceeding the compensatory measure time requirements, as specified by the Fire Operating Requirements (FORs), for fire suppression/detection equipment and fire barriers taken out of service during outages. The compensatory measures (i.e., backup fire suppression and/or fire watches) will remain in place until the equipment is placed back in service after the necessary outage-related work is completed.	2/11/99
4	Revision 4 to the FPR is in support of DCN D-20152. The change to the FPR involves deleting the discussion on the smoke detection in the ventilation intake ducts in the Main Control Room from Part VIII, pages 53 and 54. The DCN abandons the detectors in place, and disconnects the annunciation circuits to the MCR. Pages Changed: Coversheet, i, ii, iii, v, VIII-53, VIII-54 Pages Added: None Pages Deleted: None Note: Section VIII is being included in its entirety in the R4 change package, with the specific changes denoted by revision bars.	5/28/99

Revision No.	DESCRIPTION OF REVISION	Date Approved
4	Minor format change to support electronic filing (Curator) conversion.	8/19/99
5	Revision 5 to the Fire Protection Report (FPR) was performed to incorporate the following changes: • Added Part II, Section 14.7 to incorporate new Fire Operating Requirement (FOR) 3.7.14 and Surveillance Requirement (SR) 4.7.14 for Emergency Battery Lighting (EBL) units, including compensatory actions and testing frequencies. Also revised Part V "Emergency Lighting and Reactor Coolant Pump Oil Collection" to address new FOR and SR; • Revised Part II, Section 14.5 (FOR/SR 3/4.7.11.4) for Fire Hose Stations to allow use of portable hose packs and removal of fire hoses from the hose stations inside the Reactor Buildings; • Clarified definitions for continuous and roving fire watches in Part II, Section 13.0; • Clarified compliance with NFPA-72D regarding exception to G-73 for bypassing the audible annunciation system in the Main Control Room (MCR), Panel 0-M-29, under the direct supervision of a dedicated operator at the console. • Revised Section 3.31 of Part VII to replace summary of superseded calculation MDQ0026-980017, "Fire Barrier Rating Evaluation for Hollow Block and Partially Filled 8" Concrete Block Walls" with calculation SCG1S591, "Fire Ratings of Hollow Core Masonry Walls." • Corrected minor documentation discrepancy in Part II, Table 3.3-11, in which the number of ionization fire detectors for Zone 230 was listed as 9, instead of the correct number of 10 detectors in the zone. • Revised Part II, Section 14.0 to reference Calculation SQN-SQS2-203, which addresses processes for restoring inoperable Appendix R equipment that is not currently bounded by existing Tech Specs to operable status. • Minor administrative change to Revision 4 Rev Log description to delete statement regarding MCR HVAC duct smoke detector abandonment in response to a recommendation from QA audit SSA0001. The recommendation was to remove the statement, "The duct detectors have been determined unnecessary based on the absence of industry in the vicinity that could be capable of producing significant enough smoke to affect the habitability in the MCR, and the detectors in the El. 732.0' Mechanical Equipment Room which will detect smoke entering the MCR ventilation system intake and subsequently alarm in the MCR," because it provided unnecessary detail that was not discussed in the FPR.	6/2/2000

Revision No.	DESCRIPTION OF REVISION	Date Approved
6	Changed required testing frequency for inaccessible detectors from "each COLD SHUTDOWN exceeding 24 hours unless performed in the previous 6 month" to every 18 months during cold shutdowns (page II-42). Related editorial changes to this page, FPR cover sheet, and the table of contents.	10/18/00
7	Changed the compensatory actions for LCO 3.3.3.8 to delete fire watches and temperature monitoring inside primary containment upon failure of a detector inside primary containment (page II-42). The bases for the LCO compensatory actions for inoperable detectors inside primary containment were also changed. (pages II-65 and 66).	1/29/01 (effective 2/1/01)
8	This revision incorporates the following changes to part II: • Changes the testing frequency for detectors which require removing plant equipment from service from 6 to 18 months and deletes the requirement to perform the 18 month detector tests during cold shutdowns from Surveillance Requirement 4.3.3.8.1 on page II-42. • Adds a fire detection basis on page II-66 for the above change in test frequency which gives examples of the equipment which must be removed from service for detector testing (EGTS, ABGTS, CREVS and containment purge). They two above changes are corrective action for PER-00-006637-000. • Adds a definition for "accessible" on page II-5. • Adds an existing heat detector to zone 466 in Table 3.3-11 on page II-49. • Adds a end-of-quarter "grace period" to the annual fire brigade medical examination requirement on page II-20. • Deletes three references to raw service water flow diagrams and adds five references to fire protection flow diagrams on page II-73 (added diagrams are for the fire pumps/tanks, yard piping, the ERCW Bldg. and two cable tray water spray systems). Related editorial changes were made to this Rev. Log, the FPR cover sheet, and the table of contents.	2/26/01
9	This revision incorporates the following changes to the FPR Parts III and V , due to the Vital Inverter System modification per DCN D20071A/P20872A as applicable: • Added references to DCN D20071A/P20872A, see section 11.2.13 of Part III and section 4.1.5 of Part V. • Revised the description of the 120VAC Vital Instrument and 250Vdc Power System, see section 4.10.3 and 4.10.5 respectively, of Part III. • Added Components to the illuminated list of Part V, see Table V-1, pages V-4 and V-7. Related editorial changes were made to this revision log, the FPR cover sheet and the table of contents. The Nuclear Safety Assessment for the above changes is in the "Fire protection (Appendix R)" section of Block 15 in DCN D20071A	10/12/2001

Revision No.	DESCRIPTION OF REVISION	Date Approved
10	Changed Part II, Section 14.1 (page II-42) as follows: Extended the frequency for fire detector testing required by Surveillance Requirement (SR) 4.3.3.8.1 from 6 to 12 months. Added a requirement to test required fire detection zones each 6 months to existing SR 4.3.3.8.3. Changed SR 4.3.3.8.2 by limiting supervision testing to the wiring between required local alarm panels and the alarm receiving console. The previously required testing of zone supervision was deleted. Changed LCO action 3.3.3.8c by providing actions to take in the event the supervision tested via revised SR 4.3.3.8.2 fails or a loop failure trouble is annunciated. Previously, this action required a corrective action/reportability review if inoperable detectors are not restored to operation within 14 days. This action is no longer needed since it is already included in actions 3.3.3.8a and b. Changed LCO action 3.3.3.8b to make it explicit that it is the loss of automatic suppression system actuation which requires implementation of the action. Changed Part II, fire detection bases (page II-66), by adding bases for the fire suppression system actuation testing, the new zone testing and for the revised supervision testing. The later includes a discussion of the application of the LCO actions in the event of a supervision test failure or a failure of the circuits between required panels and the alarm receiving console. Changed Part VI as follows: Section 1.0 (page VI-1)- added a requirement that future significant deviations from NFPA testing, inspection, maintenance and testing requirements will be addressed in Part VI. Section 3.3.11 (page VI-13)- added a detector testing deviation (12 vs. 6 month frequency). Related editorial changes were made to this Revision Log, the Cover Sheet, and the Table of Contents.	9/25/01 (effective 11/28/01)

Revision No.	DESCRIPTION OF REVISION	Date Approved
11	PART II Changes Page 1, section 2.0: Deleted words "plans for". Sentence now reads "___ and outlines the fire protection, fire detection and suppression capability ___. Page 2, section 4.1 - Added reference 4.1.12. Section 4.2 - Changed 4.2.2 from NP STD 12.15, "Fire Protection" to FPDP-1, "Conduct of Fire Protection". Page 3 - Added sections 4.2.11 FPDP-3, "Management of the Fire Protection Report"; 4.2.12 SPP 10.9, "Control of Fire Protection Impairments"; 4.2.13 SPP 10.10, "Control of Transient Combustibles"; and 4.2.14 SPP 10.11, "Control of Ignition Sources". Page 5, section 5.0: Clarified definition of Accessible to now read "Paths to and from areas that contain equipment ___. Page 6 - changed fire to Fire Page 7, Fire Severity: Revised 17 edition to 17th edition Page 14, section 7.4 - added to Operations Manager responsibilities "fire safe shutdown implementing procedures" Page 20, section 9.1: Delete number 2 from second sentence. Sentence now reads: "The fire brigade shall not include the Shift Manager and other members of the minimum shift crew ___." Added table for minimum operator staffing Page 23, section 9.5: Corrected typo error by replacing Ns with -. Revised last sentence to now read: "Safe shutdown procedures are available in the event a fire occurs in areas of the plant containing FSSD equipment." Page 25, section 11.0: Change word systems to requirements. Sentence now reads: "Fire watch requirements are established ___." Page 26, section 12.1: Moved first sentence to later in the paragraph and deleted "when the fire pumps are not running" from second sentence. Page 28, section 12.3: Revised last sentence by replacing prevent with address to read: "The annulus area ___ water spray on select cable concentrations and to address specific cable interactions." Page 29, section 12.3.3: In third paragraph, replace considered with addressed. Sentence now reads: "Personnel safety is addressed by providing ___." Page 31, first sentence: Corrected typo error by deleting =. Page 33, section 12.10.2: Added "spatial separation greater than 20 feet" to last sentence so it now reads: Inside the reactor building ___ a combination of spatial separation of greater than 20 feet, ___." Page 34, section 12.10.5: Added "in ventilation openings" to first sentence so it now reads: "Fire damper are normally provided in ventilation openings in fire barriers ___." Deleted "a single failure"	3/5/02 (effective 3/11/02)

Revision No.	DESCRIPTION OF REVISION	Date Approved
11 (Continued)	PART III Page 1, section 1.1: Clarified that evaluation of CB fire also considered offsite power available Page 2, first paragraph: Spelled out reactor coolant system before RCS Page 3, section 2.4: Spelled out residual heat removal before RHR Page 5, section 3.4.1: Spelled out control rod drive mechanisms before CRDM, reactor vessel head vents before RVHV, and power operated relief valves before PORV Page 6, section 3.4.2: Spelled out centrifugal charging pump before CCP, emergency raw cooling water before ERCW, component cooling water system before CCS, volume control tank before VCT, and reactor coolant pump before RCP Page 10, section 4.3: Spelled out main feedwater isolation valve before MFIV and main feedwater before MFW Page 14, section 4.9 - Added to last paragraph :If fans are not operable due to fire damage on fan electrical circuits, adequate ventilation can be achieved by opening the double doors to the room." Page 21 - Deleted "performed" from middle paragraph. CASE 2) replaced "Two wire ungrounded dc power circuit cable to cable fault (125V)" with "More than one conductor to conductor hot short within one fire affected cable (125VDC/120VAC)" CASE 3) replaced "Two wire ungrounded ac control circuit cable-to-cable faults (125VDC/120VAC)" with "More than one conductor to conductor hot short between cable-to-cable faults (125VDC/120VAC). Last paragraph starts "With respect to Cases 1), 2), and 3); deleted 2) and 3). Similarly, with respect to Cases 2 and 3 added. Added to same sentence "or ac power circuit, more than one conductor to conductor selective hot short with the proper polarity " and deleted two electrically independant cable to cable shorts". Page 22 - Added section 7.14 HIGH IMPEDANCE FAULTS Page 26, Table III-1 Revised Key 38 to Key 38/39 Table III-2 and III-3 - Replaced with tables with information in Appendices C and D from the safe shutdown equipment calculation (SQS4-127). Tables still contain same information. Table III-4 was added. Copied from SQS4-127 Appendix E.	

Revision No.	DESCRIPTION OF REVISION	Date Approved
11 (Continued)	PART V changes are as follows: Page 1, sectin 2.0: Added "The Turbine building lights are fed from the 6.9kv Common Board (located in the Turbine Building) and will not be lost for a fire in either the Auxiliary or Control Building that would require manual action(s) in the Turbine Building." Next to last sentence of first paragraph revised to read "The DGB has lighting provided by lighting cabinets that are separated by three hour fire barriers." Table V-1 changes are as follows: Page 4: For 0-LGT-247-R001 deleted & Doors For 0-LGT-247-R011, R012, R013, R014 added & General Area For 0-LGT-247-R016 deleted CRDM MG set BKR A & B; added General Area Page 5: For 0-LGT-247-R040 revised doors to door For 0-LGT-247-R044 added "and bulkhead connections to 0-FCO-31C Page 6: For 0-LGT-247-R047, R048, R051, R052, R062, R063 and R066 added "& General Area" Page 7: For 0-LGT-247-R075 expanded coverage to read "125VDC Vital Batt Bd 1-I (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-I(switch)" For 0-LGT-247-R076, expanded coverage to read "125VDC Vital Batt Bd 1-II (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-II(switch)" For 0-LGT-247-R077 added "& General Area" For 0-LGT-247-R079, expanded coverage to read "125VDC Vital Batt Bd 1-III (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-III(switch)" For 0-LGT-247-R080, expanded coverage to read "125VDC Vital Batt Bd 1-IV (bkrs on Pnl 2 & rear of Pnl 4) & 120VAC Vital Instrument Power Board 1-IV(switch)" For 0-LGT-247-R081 added "& Isle behind 480V Shutdown Board 2B2-B For 0-LGT-247-R089 revised doors to door Page 8: For 0-LGT-247-R090 revised doors to door For 0-LGT-247-R094, R0108, R113 and R116 added "& General Area" For 0-LGT-247-R109, added "2-FCV-1-18" For 0-LGT-247-R111, deleted "2-FCV-1-18" Page 9: For 0-LGT-247-R122, R125, R126 and R132 added "& General Area" For 0-LGT-247-R127 and R129 revised doors to door Page 10: For 0-LGT-247-R152, R153, R155 and R156 added "& General Area" Page 11: For 0-LGT-247-R170, deleted "Sump Valve Box" and added "& General Area" For 0-LGT-247-R175 and R179, added "Sump Valve Box & General Area" For 0-LGT-247-R202, R203, R204 and R205 added "& General Area" Added 0-LGT-247-R206 and R207 (per EDC E21158A)	

Revision No.	DESCRIPTION OF REVISION	Date Approved
11 (continued)	PART VII Page 16, section 2.10.5: Added paragraph to Deviation Update to clarify open head spray system actuated by combination of line type thermal and area smoke detectors. Page 48, section 3.4.3.4.1.1: Added detail to clarify that separation in area is by spatial separation greater than 20 feet (III.G.2.d) or automatic suppression and detection (III.G.2.e). PART VIII Page 33, section D.5(d): Corrected information concerning antenna associated with the plant repeater system and added clarification statement in "Remarks" column	

LIST OF TABLES

PART II - FIRE PROTECTION PLAN

PART III- SAFE SHUTDOWN CAPABILITIES

PART V - EMERGENCY LIGHTING AND REACTOR COOLANT PUMP OIL COLLECTION

PART VII - DEVIATIONS AND EVALUATIONS

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN

(All drawings will be current active version)

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN (Continued)

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN (Continued)

PART III - SAFE SHUTDOWN CAPABILITIES

PART X - FIRE HAZARDS ANALYSIS

1.0 PURPOSE AND SCOPE

Part II of the Sequoyah Nuclear Plant (SQN) Fire Protection Report describes the Fire Protection Plan (Plan) developed for SQN to ensure compliance with the requirements of 10 CFR 50.48 paragraphs (a) and (e), 10 CFR 50, Appendix R, Sections III.G, J, L, and O and the guidelines of Appendix A to Branch Technical Position (BTP) APCSB 9.5-1.

The Plan is applicable to Unit 1, Unit 2, and common areas needed for safe operation of SQN. Part II provides drawings for information only to more fully describe the Fire Protection Systems available. Compartmentation drawings are provided for information in Part X.

The latest drawings and associated change paper should be obtained when necessary. Fire protection features are described in the fire hazards analysis (refer to Part X).

2.0 OBJECTIVES OF THE FIRE PROTECTION PLAN

The Plan describes the controls associated with the SQN Fire Protection Program (FPP); identifies the organizations and positions that are responsible for the FPP; describes the authority of positions responsible for implementing the FPP; and outlines the fire protection, fire detection and suppression capability, and limitation of fire damage. The Plan describes the features necessary to implement the FPP such as: administrative controls; personnel requirements for fire prevention and manual fire suppression activities; automatic and manually operated fire detection and suppression systems; and the means to limit fire damage to structures, systems, and components important to safety so that the capability to safely shutdown the plant is ensured.

The Plan describes the measures that are established at SQN to extend the concept of defense-in-depth to fire protection in areas important to safety. These measures are established:

- to prevent fires from starting,
- to rapidly detect, control, and promptly extinguish those fires that do occur, and
- to provide protection for systems important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

3.0 BASIS OF THE FIRE PROTECTION PLAN

The Plan at SQN has been developed to comply with and is based upon the requirements of General Design Criterion 3 in Appendix A to 10 CFR 50, 10 CFR 50.48, paragraphs (a) and (e), and TVA's commitment to implement Sections III.G, III.J, and III.O to 10 CFR 50, Appendix R and Appendix A to Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976" (August 23, 1976). The requirements contained in Section III.L of Appendix R to 10 CFR 50 are also applicable to areas where alternate shutdown capability is selected. This Plan establishes the policy for and describes the manner in which TVA conforms with these requirements and the guidelines which have been promulgated to describe acceptable implementation methods. The applicable guidelines used as the basis for the Plan are listed in Section 4.1, Regulatory Documents.

4.0 REFERENCES

4.1 Regulatory Documents

4.1.1 Branch Technical Position (Auxiliary Power and Control Systems Branch) 9.5-1, Appendix A

4.1.2 10 CFR 50.48 - Fire Protection

4.1.3 10 CFR 50, Appendix A, Criterion 3 - "Fire Protection"

4.1.4 10 CFR 50 Appendix R - Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979

4.1.5 NRC letter dated August 29, 1977 - Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance

4.1.6 Generic Letter 81-12 - Fire Protection Rule and NRC Memorandum of Clarification for Generic Letter 81-12, dated March 22, 1982

4.1.7 Generic Letter 82-21 - Technical Specifications for Fire Protection Audits

4.1.8 Generic Letter 83-33 - NRC Positions on Certain Requirements of Appendix R to 10 CFR 50.

4.1.9 Generic Letter 86-10 - Implementation of Fire Protection Requirements

4.1.10 Generic Letter 86-10 - Supplement 1 - Fire Endurance Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains within the Same Fire Area

4.1.11 Generic Letter 88-12 - Removal of Fire Protection Requirements from Technical Specifications

4.1.12 Generic Letter 91-18 - Information to Licensees regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability.

4.1.13 NUREG-0452, Standard Technical Specifications for Westinghouse Pressurized Water Reactors, Revision 4 (referred to as standard Technical Specifications).

4.1.14 USNRC Regulatory Guide 1.75, "Physical Independence of Electric Systems"

4.1.15 USNRC Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants"

4.2 TVA Documents

4.2.1 SQN Engineering Design Criteria, Drawings, Appendix R Key Calculations

4.2.2 FPDP-1, "Conduct of Fire Protection"

4.2.3 SPP 10.12, "Fire Protection Quality Assurance"

4.2.4 TVA-NQA-PLN89-A, "Nuclear Quality Assurance Plan"

4.2.5 General Engineering Specification G-73, "Installation, Modification, and Maintenance of Fire Protection Systems and Features"

4.2.6 General Engineering Specification G-96, "Installation, Modification, and Maintenance of Penetration Seals"

4.2.7 General Engineering Specification G-98, "Installation, Modification, and Maintenance of Electrical Raceway Fire Barrier Systems"

4.2.8 Mechanical Design Standard DS-M17.2.2, "Electrical Raceway Fire Barrier Systems"

4.2.9 System Description Document N2-302-400, "Penetration Seals" (formerly Engineering Report No. 0006-00902-01, "Penetration Seal Program Assessment Report").

4.2.10 TVA Calculation SQN-SQS2-203, "Evaluation of Fire Safe Shutdown Equipment for IE Notice 97-048."

4.2.11 FPDP-3, "Management of the Fire Protection Report"

4.2.12 SPP 10.9, "Control of Fire Protection Impairments"

4.2.13 SPP 10.10, "Control of Transient Combustibles"

4.2.14 SPP 10.11, "Control of Ignition Sources"

4.3 Other Documents

4.3.1 ASTM E84 - Test for Surface Burning Characteristics of Building Materials

4.3.2 ASTM E119 - Fire Tests of Building Construction and Materials

4.3.3 ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops

4.3.4 Fire Protection Handbook, 14th Edition, National Fire Protection Association.

4.3.5 Fire Protection Handbook, 17th Edition, National Fire Protection Association.

4.3.6 Report of the Test of Internal Conduit Seals

4.3.7 Conduit Fire Protection Research Program (Wisconsin Test Report), 5/18/87

4.4 NFPA Codes and Standards

NOTE: Part VI of this Fire Protection Report documents the level of compliance with the NFPA codes and standards identified in Section 4.4. Other codes and standards referenced in Appendix A to BTP 9.5-1 are also addressed in Part VI. Deviations from code criteria that impact operational capability of the systems are documented in Part VII of the FPR.

4.4.1 NFPA 10-1975, "Portable Fire Extinguishers"

4.4.2 NFPA 12-1973, "Carbon Dioxide Extinguishing Systems"

4.4.3 NFPA 13-1975, "Installation of Sprinkler Systems"

4.4.4 NFPA 14-1974, "Standpipe and Hose Systems"

4.4.5 NFPA 15-1973, "Water Spray Fixed Systems for Fire Protection"

4.4.6 NFPA 20-1973, "Centrifugal Fire Pumps" for electric driven fire/flood mode pumps

4.4.7 NFPA 20-1993, "Centrifugal Fire Pumps", for dedicated UL/FM electric motor driven and diesel engine driven pumps.

4.4.8 NFPA 24-1973, "Outside Protection"

4.4.9 NFPA 30-1973, "Flammable and Combustible Liquids"

4.4.10 NFPA 72D-1975, "Proprietary Protective Signaling Systems"

4.4.11 NFPA 72E-1974, Automatic Fire Detectors"

4.4.12 NFPA 80-1981, "Fire Doors and Windows"

4.4.13 NFPA 90A-1975, "Air Conditioning and Ventilating Systems"

4.4.14 NFPA 194-1974, AFire Hose Connections "

4.4.15 NFPA 196-1974, AFire Hose "

4.4.16 NFPA 220-1985, "Types of Building Construction"

4.4.17 NFPA 251-1985, "Fire Tests of Building Materials"

5.0 DEFINITIONS

Accessible - Paths to and from and areas that contain equipment not located in an inaccessible area (see definition).

Action - ACTION shall be the part of a Specification which prescribes remedial measures required under designated conditions (FPR Preparer)

Approved - Tested and accepted for a specific purpose or application by a nationally recognized testing laboratory or acceptable to the authority having jurisdiction.
(FPR Preparer)

Authority Having Jurisdiction (AHJ) - The organization, office, or individual responsible for "approving" equipment, an installation, or a procedure. (For TVA nuclear power facilities, the Corporate Engineering Chief Engineer is the AHJ per NP STD 12.15 and serves as the central point of contact with other organizations) (NRC, Insurance Carrier). (G-73)

Automatic - Self-acting, operated by its own mechanism when actuated by some impersonal influence such as a change in current, pressure, temperature or mechanical configuration. (G-73)

Barrier - A feature of construction provided to separate or enclose various occupancies to create a boundary limit based on functional requirements, or a flexible material designed to withstand the penetration of water, vapor, grease, or harmful gases. (G-96)

Channel Functional Test - A CHANNEL FUNCTIONAL TEST shall be:

a. Analog channels - the injection of a simulated signal into the channel as close to the sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

b. Bi-stable channels - the injection of a simulated signal into the sensor to verify OPERABILITY including alarm and/or trip functions.

c. Digital channels - the injection of a simulated signal into the channel as close to the sensor input to the process racks as practicable to verify OPERABILITY including alarm and/or trip functions. (FPR Preparer)

Combustible Material - Material which does not meet the definition of noncombustible. Any material which in the form in which it is used and under the conditions anticipated will ignite and burn (e.g., cable insulation, lube oil, plastic sheeting, charcoal, paper, etc.) (G-73)

Combustible Liquid - A liquid having a flash point at or above 100 °F (37.8 °C). (G-73)

Electrical Raceway Fire Barrier System (ERFBS)- A special type of Fire Barrier System designed to protect electrical raceways (e.g., conduits, cable trays, junction boxes, etc.) containing FSSD circuits required for Appendix R safe shutdown. (DS-M17.2.2)

Engineering - The organization responsible for the design basis of the plant. (G-73)

Fire Area (FA) - That portion of a building or plant that is separated from other areas by boundary fire barriers. (G-73) These FAs are defined on the compartmentation drawings and supported by the Fire Hazards Analysis. One room or several rooms may constitute a single fire area. A fire area may be further subdivided by additional barriers. (FPR Preparer)

Note: For the purposes of fire watch compensatory actions, Fire Areas have 3 hour rated fire barriers. Fire areas are further subdivided into 1.0- or 1.5-hour fire area and/or zones. These 1.0- or 1.5-hour compartments are analogous to the fire zones in earlier definitions and the Basis for Technical Specification 3.7.12. (FPR Preparer)

Fire Barrier - Those components of construction walls, floors, ceilings, and their supports including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire. (G-73) ERFBS and radiant energy shields are also considered as fire barriers. Fire barriers that are not rated may be used when approved in accordance with a NRC Generic Letter 86-10 evaluation or equivalent. This definition does not include those barriers installed for RG 1.75 for less than 3' horizontal or 5' vertical separation of redundant cable trays. (FPR Preparer)

Fire Damper - A device, installed in the air distribution system, designed to close upon detection of heat or release as the result of a signal from a sensing device such as a CO_2 discharge signal or a smoke detector, to interrupt migratory air flow, and to restrict the passage of flame. A combination fire and smoke damper shall meet the requirements of both. (G-73)

Fire Detector - A device designed to automatically detect the presence of fire and initiate an alarm system and other appropriate action (see NFPA 72E, "Automatic Fire Detectors"). (G-73)

Fire Door - The door component of a fire door assembly. (G-73)

Fire Door Assembly - Any combination of a fire door, frame, hardware, and other accessories, that together provide a specific degree of fire protection to the opening. (G-73)

Fire Hazards Analysis (FHA) - An analysis performed by fire protection and systems engineers to consider potential in situ and transient fire hazards; determine the consequences of fire in any location in the plant on the ability to safely shutdown the reactor or on the ability to minimize and control the release of radioactivity to the environment and specify measures for fire prevention, fire detection, fire suppression and fire containment and alternative shutdown capabilities as required for each fire area containing structures, systems and components important to safety that are in conformance with NRC guidelines and regulations. The FHA demonstrates that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive release to the environment in the event of a fire, and should verify that NRC FPP guidelines or equivalent level of protection have been met. (G-73)

Fire Loading - The amount of combustibles present in a given situation, expressed in BTUs per square foot. (G-73)

Fire Rated Assembly - A passive fire protection feature that is used to separate redundant fire safe shutdown capabilities. A fire rated assembly includes fire rated walls, floors, ceilings, ERFBSs, equipment hatches, stairwells, doors, dampers, and penetration seals. (FPR Preparer)

Fire Rated Penetration Seal - An opening in a fire barrier for the passage of pipe, cable, etc., which has been sealed so as not to reduce the integrity of the fire barrier.
(DS-M17.2.2)

Fire Resistance Rating - The time that materials or assemblies have withstood a fire exposure in accordance with the test procedures of NFPA 251, *Standard Methods of Fire Tests of Building Construction and Materials.* (G-73)

Fire Safe Shutdown (FSSD) Equipment - Structures, systems, or components required to shutdown the reactor and maintain it in a safe shutdown condition in the event of a fire. Structures, systems, and components used to satisfy fire safe shutdown requirement commitments do not have to be safety-related. (FPR Preparer)

Fire Severity - A unit of measure, in terms of time (hours or minutes) that is used to quantify the hazards associated with the fire loading in a given plant area. It is based on an approximate relationship between fire loading and exposure to a fire severity equivalent to the standard time-temperature curve, as defined by ASTM E-119. The fire loading of ordinary combustibles such as wood, paper, and similar materials with a heat of combustion of 7000 to 8000 Btu per lb. is related to hourly fire severity. It should not be used with combustibles having a high heat-release rate. The following Fire Severity Index is used to qualify the hazards associated with the combustible loading and was developed based on information from Section 6 / Chapter 6, 17th edition of the Fire Protection Handbook. (FPR Preparer)

FIRE SEVERITY INDEX	COMBUSTIBLE LOADING	EQUIVALENT FIRE SEVERITY
Insignificant	< 6,500 BTU/sq. ft.	< 5 minutes
Low	< 80,000 BTU/sq. ft.	< 60 minutes
Moderate	< 160, 000 BTU/sq. ft.	< 120 minutes
Moderately Severe	< 240,000 BTU/sq. ft.	< 180 minutes
Severe	> 240,000 BTU/sq. ft.	> 180 minutes

Fire Suppression - Control and extinguishing of fires. Manual fire suppression is the use of hoses, portable extinguishers, or manually-actuated fixed systems by plant personnel. Automatic fire suppression is the use of automatically actuated fixed systems such as water, Halon, or carbon dioxide systems. (G-73)

Fire Wall - A wall having adequate fire resistance and structural stability under fire conditions to accomplish the purpose of subdividing buildings to restrict the spread of fire. (DS-M.17.2.2)

Fire Watch - A fire watch is a compensatory action used when fire protection systems or features are inoperable or impaired as required by Operating Requirements (ORs). Additionally, fire watches may be utilized for compensatory actions when limits are exceeded in administrative controls for areas (e.g., excessive transient fire loads).
(FPR Preparer)

Fire Watch-Hourly - Hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes. (FPR Preparer)

Fire Watch-Continuous - A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period. (FPR Preparer)

Fire (Protection) Water Distribution System - The piping and appurtenances on TVA property between a source of fire protection water and the base of the riser (flange of flange and spigot piece or base tee) for automatic sprinkler systems, fixed water spray systems, standpipe systems, and other water based fire suppression systems. (G-73)

Flammable Liquid - A liquid having a flash point below 100°F and having a vapor pressure not exceeding 40 lbs/in^2 (absolute) at 100°F shall be known as a Class I Liquid.
(G-73)

Frequency - Each Surveillance Requirement (SR) has a specified Frequency in which the SR must be met in order to meet the associated Operating Requirement (OR). The "specified frequency" is referred to in Section 14. (FPR Preparer)

Functional Test - The injection of a simulated signal into the sensor or device to verify the operability, including alarm and/or activation functions. (FPR Preparer)

Inaccessible Area - Those areas defined by the FSAR Chapter 12.1 as a High Radiation Area or a Very High Radiation Area. Areas may be designated as inaccessible by the Fire Protection Manager because operating conditions that pose immediate danger to life and health from environmental or operational conditions. (FPR Preparer)

In-Situ Combustible Loads - Combustible material permanently located in a room or fire area. The total amount of in-situ combustibles in a fire area is used to determine the fire severity rating. The combustible loading values and fire severity ratings are included in the Fire Hazards Analysis. (FPR Preparer).

Internal Conduit Seals

a. Smoke and Hot Gas Seals - Noncombustible seals installed inside conduit openings to prevent the passage of smoke and hot gasses through fire barriers. These seals may be located at the fire barrier or at the nearest conduit entry on both sides of the fire barrier. Smoke and hot gas seals are not required to have a fire resistance rating equal to the fire barrier they are installed in. (G-96)

b. Heat and Fire Seals - Fire rated seals installed inside conduits at or in close proximity to the fire barrier. Heat and fire seals have the same or greater fire resistance rating as the fire barrier they are installed in. (G-96)

Labeled - Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the authorities having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (G-73)

Limited Combustible Material - As applied to a building construction material, a material not complying with the definition of noncombustible material, which, in the form in which it is used, has a potential heat value not exceeding 3500 Btu per lb. (8141 kJ/Kg), and complies with one of the following paragraphs (a) or (b). Materials subject to increase in combustibility or flame spread rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.

(a) Materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1/8 in. (3.2mm) which has a flame spread rating not greater than 50.

(b) Materials, in the form and thickness used, other than as described in (a), having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread rating greater than 25 nor evidence of continued progressive combustion. (NFPA 220)

Listed - Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner. (G-73)

Noncombustible Material - 1) A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat; having a structural base of noncombustible material, as defined above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using ASTM E84 Test, "Surface Burning Characteristics of Building Materials". (G-73) 2) A material which, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat

Materials which are reported as passing ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, shall be considered noncombustible materials. (NFPA 220)

Operable-Operability - A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power source, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s). (FPR Preparer)

Operational Mode - Mode - An OPERATIONAL MODE (i.e., MODE) shall correspond to any one inclusive combination of core reactivity condition, power level and average reactor coolant temperature specified in Table 5.1. (FPR Preparer)

Operating Requirement (OR) - The lowest level functional capabilities or performance levels of equipment required to ensure adequate fire protection capability is established and maintained to protect safety-related and FSSD equipment from the effects of fire. When an OR is not met, action statements are provided to describe remedial action until the OR can be met. (FPR Preparer)

Penetration - An opening through structural members or barriers such as walls, floors, or ceilings for passage of penetrating components (G-96)

Penetration Seal - Materials, devices, or assemblies installed in communicating spaces across barriers, which provide effective sealing against defined environmental exposure criteria to achieve the same functional requirement as that originally intended by the structural member or the barrier. (G-96)

Portable Fire Extinguisher - A portable device containing powder, liquid, or gases which can be expelled under pressure for the purpose of suppressing or extinguishing a fire.
(FPR Preparer)

Pre-action Sprinkler System - A system employing automatic sprinklers attached to a piping system connected to a water supply containing air that may or may not be under pressure, with a supplemental fire detection system installed in the same area as the sprinklers. Actuation of the fire detection system (as from a fire) opens a valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that may be open. (G-73)

Primary Containment - A structure that acts as a barrier to the release of radioactive fission products or other radioactive substances. Primary containment is a gas-tight shell that receives and contains the water, steam, and fission products that flow from any break in the reactor coolant pressure boundary located within primary containment. (FPR Preparer)

Safety-Related - Items that meet the following criteria:

a. Those functions that are necessary to ensure:

(1) The integrity of the reactor coolant pressure boundary.
(2) The capability to shut down the reactor and maintain it in a safe condition.
(3) The capability to prevent or mitigate the consequences of an incident which could result in potential offsite exposures comparable to those specified in 10 CFR 100.
(G-73)

Safety-Related Area - Any area containing safety-related equipment. Safety-related areas include: Unit 1 Reactor Building, Unit 2 Reactor Building, Auxiliary Building (including Unit 1 & 2 Additional Equipment Buildings) , Control Building, Intake Pumping Station, Essential Raw Cooling Water Pump Station, Diesel Generator Building, cable/conduit duct banks between safety-related buildings, and portions of the Yard containing safety-related equipment. (FPR Preparer)

Secondary Containment - The structures (annulus and auxiliary building) that provides a plenum for the temporary, low pressure retention of gaseous leakage from primary containment. (FPR Preparer)

Smoke Detector - A device which detects the visible or invisible particles of incomplete combustion. (G-73)

Sprinkler System - A network of piping connected to a reliable water supply that will distribute the water throughout the area protected and will discharge the water through sprinklers in sufficient quantity either to extinguish the fire entirely or to prevent its spread. The system, usually activated by heat, includes a controlling valve and a device for actuating an alarm when the system is in operation. Specific systems are manually actuated and do not contain a device for actuating an alarm when the system is in operation. (FPR Preparer)

Staggered Test Basis - A STAGGERED TEST BASIS shall consist of:

a. A schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals,

b. The testing of one system, subsystem, train or other designated component at the beginning of each subinterval. (FPR Preparer)

Standpipe and Hose System - An arrangement of piping, valves, hose connections, and allied equipment installed in a building with the hose connections located in a manner that the water can be discharged in streams or spray patterns through attached hose and nozzles, for the purpose of extinguishing a fire and so protecting a building and its contents in addition to protecting its occupants. This is accomplished by connections to water supply systems or by pumps, tanks and other equipment necessary to provide an adequate supply of water to the hose connections. (G-73)

Testable Valves - Refers to valves such as Outside Screw and Yoke (OS&Y), butterfly, and gate, (with or without automatic operators) that are designed to be cycled or exercised to ensure operation and prevent binding. This does not refer to valves such as check valves, solenoid valves, alarm test valves, or suppression system water flow alarm valves. (FPR Preparer)

Thermal Detector - A device that detects abnormally high temperature or rate of temperature rise. (FPR Preparer)

Transient Fire Loads - Any combustible material that is not permanently present in a given area, and may be introduced during maintenance, repair, rework, or may be transported to a final destination for permanent installation or maintenance, repair, rework of equipment systems and components present there. (G-73)

Water Spray Nozzle - A normally open water discharge device which, when supplied with water under pressure, will distribute the water in a special, directional pattern peculiar to the particular device. (G-73)

Water Spray System - A special fixed piping system connected to a reliable source of fire protection water supply and, equipped with water spray nozzles for specific water discharge and distribution connected to the water supply through an automatically or manually actuated valve which initiates the flow of water. An automatic valve is actuated by operation of automatic detection equipment installed in the same areas as the water spray nozzles (in special cases the automatic detection equipment may also be located in another area). (G-73)

Water Supply - An arrangement of pumps, piping, valves, and associated equipment necessary to provide an adequate, reliable supply of water for the extinguishment of fires.
(FPR Preparer)

TABLE 5 1

OPERATIONAL MODES

MODE	REACTIVITY CONDITION, K_{eff}	% RATED THERMAL POWER*	AVERAGE COOLANT TEMPERATURE
1. POWER OPERATION	≥0.99	>5%	≥350°F
2. STARTUP	≥0.99	≤5%	≥350°F
3. HOT STANDBY	<0.99	0	≥350°F
4. HOT SHUTDOWN	<0.99	0	$350°F > T_{avg} > 200°F$
5. COLD SHUTDOWN	<0.99	0	≤200°F
6. REFUELING**	≤0.95	0	≤140°F

* Excluding decay heat.

** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

6.0 FIRE PROTECTION QUALITY ASSURANCE

TVA has developed an augmented Quality Assurance (QA) Program for fire protection which satisfies the guidelines for QA for Fire Protection established by Appendix A to Branch Technical Position APCSB 9.5-1 and the Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance letter (dated August 29, 1977) for fire protection features that provide protection for safety-related structures, systems or components and fire safe shutdown systems. Refer to Part VIII of the FPR for a comparison of the SQN Fire Protection Program with Appendix A guidelines.

The QA program for fire protection uses the applicable parts of the TVA Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). More stringent QA requirements may apply to fire protection features that also perform nuclear safety-related functions such as containment isolation. This QA program is described in corporate Standards and implemented in SQN procedures.

7.0 FIRE PROTECTION ORGANIZATION/PROGRAMS

7.1 TVA Nuclear (TVAN) Corporate Management

The Senior Vice President, Nuclear Operations, TVAN, his/her equivalent or designee, has the overall responsibility for establishing policies and programs related to fire protection. The General Manager, Operations Services, his/her equivalent or designee, establishes fire protection programs and fire brigade training and qualification requirements and assesses their effectiveness. Agreements are maintained between the TVAN and TVA Fossil and Hydro Power organizations for providing training and qualification of fire brigade and Incident Commander personnel. The Senior Vice President, Nuclear Operations, TVAN, assumes or delegates the responsibility for "Authority Having Jurisdiction" (AHJ) for Operational fire protection matters.

The Vice President, Engineering and Technical Services, TVAN, has the overall responsibility for establishing the design basis of the plant systems and features related to fire protection. The Corporate Engineering Chief Engineer assumes or delegates the responsibility as the "Authority Having Jurisdiction" (AHJ) for the design basis fire protection matters.

TVAN has on staff or as a consultant, an individual(s) who meet the eligibility requirements as a Member Grade in the Society of Fire Protection Engineers.

7.2 Site Vice President (VP)

The Site VP is responsible for the development, implementation, and administration of the Fire Protection Program. Authority and accountability for overview and implementation of the program have been further delegated to the Plant Manager. Specific requirements and responsibilities related to tasks such as administrative control of fire hazards, manual fire suppression, and maintenance of fire protection equipment have been delegated to various site organizations. The Site VP also provides design, engineering, and construction resources for fire protection systems and features.

7.3 Plant Manager

The Plant Manager is responsible for management oversight of the development and implementation of the SQN Fire Protection Plan.

7.4 Operations Manager

The Operations Manager is responsible for the development, implementation, fire safe shutdown implementing procedures, and control of the SQN Fire Protection Plan. The Operations Manager provides senior management assistance and departmental interface for the resolution of fire protection-related issues referred by the Fire Protection Manager.

7.5 Fire Protection Manager

The Fire Protection Manager has overall responsibility for SQN fire protection program and related activities at the site. The Fire Protection Manager has available an individual who meets the eligibility requirements as a "member grade" in the Society of Fire Protection Engineers to support the fire protection administrative program.

Fire Protection Engineers are provided, for fire protection systems and features, to provide technical leadership to plant personnel for assigned fire protection systems and features, proactive identification and resolution of technical issues affecting fire protection systems and features, initiation of fire protection-related design modifications, and technical assistance to fire protection management, operations, and maintenance organizations.

The Fire Protection Manager has the following responsibilities:

a. Ensures that the assigned sections of the Fire Protection Report are maintained.

b. Provides oversight to the Appendix R fire protection program.

c. Represents SQN management concerning site fire protection-related issues with regulators, insurance representative, state and local authorities, and other outside agencies such as the local fire department.

d. Ensures that fire protection systems and features are tested, inspected, and maintained in accordance with provisions set forth in this Plan.

e. Supervises SQN's fire protection emergency response organization.

f. Ensures appropriate modification (design changes) and other complex work packages are evaluated for compliance with established fire protection codes and standards and regulatory commitments.

g. Ensures the overall readiness of the fire protection organization and site personnel, to combat, suppress, and report fires, perform tests, and provide technical programmatic oversight.

h. Ensures that pre-fire plans and procedures for fire emergencies are maintained.

i. Ensures periodic fire protection inspections are performed as required.

j. Administers the process that controls fire protection systems and feature impairments and restorations, and associated compensatory actions to ensure compliance with regulatory requirements.

k. Develops and implements administrative and physical controls of transient combustibles and ignition sources.

l. Ensures that work initiating documents (WID) are reviewed for impact on the elements of the Fire Protection Plan.

m. Provides advice and assistance to plant personnel on fire protection matters.

n. Ensures the fire protection system/equipment surveillance and maintenance program and its associated instructions are developed and maintained.

o. Ensures fire protection system test and surveillance results are evaluated for determination of operability status and deficiencies are correctly dispositioned.

p. Establishes and implements the periodic site training and drill requirements as outlined in this plan.

q. Ensures that fires are investigated.

r. Ensures the implementation of the augmented Quality Assurance Program for Fire Protection.

s. Ensures adequate staff and fire fighting equipment are available on site for the onsite emergency response organization.

7.6 Nuclear Engineering

The Engineering & Materials Manager is responsible for fire protection related design activities at the site. Nuclear Engineering has available an individual who meets the eligibility requirements as a "Member Grade" in the Society of Fire Protection Engineers to assist in fire protection design. Nuclear Engineering:

a. Maintains responsibility for the technical adequacy of the SQN Fire Protection Report.

b. Reviews and evaluates applicability of regulations and standards to fire protection system design activities.

c. Reviews the design, installation and modification of plant fire protection equipment and systems for conformance to regulatory requirements, general industry fire protection standards, and soliciting and integrating operational considerations into these documents.

d. Provides technical advice and assistance to plant personnel on fire protection engineering design activities.

e. Reviews design activities for impacts on Appendix R Safe Shutdown and the Fire Hazards Analysis.

f. Establishes design bases for fire suppression, fire barrier, fire detection, and alarm system.

g. Ensures the technical adequacy of permanent fire protection features installed in nuclear power plants.

h. Ensures that plant and system design considers the safety to life from fire in buildings and structures.

I. Coordinates the development of positions to generic fire protection-related engineering issues and provides support in the development of positions to site-specific licensing and insurance issues.

j. Participates in fire protection presentations, submittals, and commitments made to the NRC that involve engineering.

7.7 Nuclear Assurance

Nuclear Assurance ensures audits are performed in accordance with the Nuclear Quality Assurance Plan.

7.8 Site Personnel

The SQN Fire Protection Plan applies to Nuclear Generation employees and contractors performing activities at SQN.

Site personnel who have duties or perform work activities at SQN are responsible for being familiar with procedures applicable to them during a fire emergency and conducting day-to-day work activities in accordance with plant fire protection administrative procedures.

General employee's fire protection-related responsibilities and requirements are provided in the plant access training program. As part of their instruction, Employees are familiarized in the following areas of fire protection:

1) Fire Protection transient combustibles and hazard identification.
2) Fire Detection and the proper procedure to report a fire in the plant.
3) Fire extinguishing systems installed in the plant.
4) Compartmentation and its importance to fire protection.

Employees are instructed in the proper procedure for reporting a fire emergency. Employees are not trained or required to combat fires. Manual fire suppression is performed by personnel specifically trained in fire suppression (i.e., Fire Brigade).

8.0 FIRE PROTECTION PROGRAM ADMINISTRATIVE AND TECHNICAL CONTROLS

This section of the SQN Plan provides the administrative process and controls for implementation of the Fire Protection Program.

8.1 Program Changes and Associated Review and Approval

a. Nuclear Engineering is responsible for the technical accuracy of the SQN Fire Protection Report (FPR).

b. The Fire Protection Manager reviews proposed changes to the Fire Protection Report and fire protection administrative procedures to ensure adequacy and compliance with established regulatory commitments.

c. Changes to the Fire Protection Report receive a technical and impact review by qualified individuals.

d. The Nuclear Safety Review Board (NSRB) functions to provide for independent review and audit activities in the area of the site Fire Protection Program.

e. SQN may make changes to the approved Fire Protection Report without prior approval of the NRC only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

e. The Fire Protection Report is updated in accordance with 10CFR50.71.

8.2 Modification Control

A fire protection evaluation is performed (when required) for plant modifications in accordance with established Nuclear Engineering procedures. This evaluation is performed to ensure that adequate fire protection measures are maintained, combustible loading considerations are addressed, the overall Fire Protection Program is not degraded, and requirements and guidelines of regulatory agencies have been considered. The evaluation also addresses specific commitments to the applicable sections of 10CFR50, Appendix R.

8.3 Audits/Inspections of the Fire Protection Program

Audits are conducted to assess the SQN fire protection equipment and FPP implementation to verify continued compliance with NRC requirements and TVA commitments. These audits are conducted in accordance with the Nuclear Quality Assurance Plan.

8.4 Assessment of Information Notices, Generic Letters, Bulletins, etc.

The Sequoyah Nuclear Experience Review (NER) Program and Licensing Staff ensures that NRC Information Notices, Generic Letters, Bulletins, and other relevant documents that provide information on generic or specific fire protection and/or fire safe shutdown issues are assessed for applicability to SQN. The responsible organizations (i.e., licensing, engineering, operations, etc.) for addressing the applicable issues are determined upon assessment of the subjects identified in the documents.

8.5 Nonconformance and Reportability

Nonconformance with the requirements described in Section 14.0 shall be evaluated for reportability and corrective actions performed in accordance with site administrative procedures. Nonconformance occurs when the limits of the Surveillance Requirements (SR) (including allowable extensions) are exceeded or conditions of the associated action statement are not met.

9.0 EMERGENCY RESPONSE

9.1 Fire Brigade Staffing

Effective handling of fire emergencies is an important aspect of the SQN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for fire fighting activities. The fire brigade is comprised of a fire brigade leader and four fire brigade members.

A fire brigade of at least 5 members shall be maintained onsite at all times. The fire brigade shall not include the Shift Manager and other members of the minimum shift crew necessary for safe shutdown of the unit or any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

The following minimum operator staffing level is required for fire safe shutdown events:

POSITION	NUMBER
Shift Manager	1
Unit Supervisors*	3
Unit Operators	4
Assistant Unit Operators	8

* One Unit Supervisor will be the Incident Commander

An Incident Commander is available to direct each shift fire brigade. The Incident Commander is an Unit Supervisor (or equivalent) and has sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability.

The operations staff and fire brigade composition may be less than the minimum requirements for a period of time not to exceed two hours, in order to accommodate unexpected absence, provided immediate action is taken to fill the required positions. A life-threatening medical emergency, requiring the plant ambulance and EMT responders to leave the site for transport of the patient, is an example of an emergency that would prevent the full fire brigade from being available onsite. This is expected to be a rare occurrence.

9.2 Fire Brigade Support Personnel

a. Site Nuclear Security provides access to the security controlled area for the fire brigade and offsite fire response personnel during fire emergencies. This includes traffic, emergency vehicle, and crowd control, when necessary.

b. Site Radiological Control (RADCON) personnel provide radiological support for the fire brigade to advise the brigade on radiological hazards and assist in radiological decontamination efforts if necessary. RADCON personnel provide radiological support for offsite fire response personnel.

9.3 Training and Qualifications

SQN fire brigade training ensures that the fire brigade's capability to combat fires is established and maintained. Prior to training and annually thereafter (with a grace period to the end of the quarter in which the evaluation is due), each fire brigade member and leader receives a medical evaluation to ensure the ability to perform strenuous physical activity, to wear special respiratory equipment, and for unescorted access to nuclear plants.

The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training.

a. Initial training

Initial training consists of classroom instruction and practical exercises to include actual fire extinguishment and use of fire fighting and related equipment under strenuous fire fighting conditions. Training includes:

1) Identification of the fire hazards and associated types of fires that could occur in the plant and an identification of the location of such hazards.

2) Identification of the location of fire fighting equipment for each fire area, and familiarization with layout of the plant including access and egress routes to each area.

3) The proper use of available fire fighting equipment, and the correct method of fighting each type of fire. The types of fires covered include electrical fires, fires in cables and cable trays, hydrogen fires, flammable liquid fires, waste/debris fires, and record file fires.

4) Indoctrination of the plant fire fighting plan with specific coverage of each individual's responsibilities.

5) The proper use of communication, lighting, ventilation, and emergency breathing apparatus.

6) The toxic characteristics of expected products of combustion.

7) The proper methods for fighting fires inside buildings and tunnels.

8) Detailed review of Pre-Fire Plans and procedure changes.

9) Review of latest plant modifications and changes in fire fighting plans.

10) The direction and coordination of the fire fighting activities (fire brigade leaders only).

In addition, fire brigade leaders receive additional training that provides the fire brigade leader with the knowledge and skills necessary to supervise and direct the activities of the fire brigade during an incident.

b. Recurrent training

Training and qualification will be scheduled with a maximum allowed extension of 25 percent of the listed frequency interval.

1) Periodic Classroom Instruction

Regular planned meetings will be held every three months. These planned meetings will repeat the initial training subject matter over a two-year period.

2) Fire Drills

Drills are pre-planned to establish the objectives and are conducted by the fire training instructor or designated representative. Drills are conducted as follows:

a) A minimum of one drill per shift every calendar quarter.

b) A minimum of one unannounced drill per shift per year.

c) At least one drill per shift per year is performed on a "backshift" for each fire brigade.

d) An annual fire drill, which includes participation by the offsite fire department organization(s) that has an active agreement(s) to provide fire fighting and equipment response to the plant.

e) Fire brigade members including leaders shall participate in at least two drills per year.

f) When assigned as the shift Incident Commander, the Incident Commander shall attend all fire drills occurring during that shift.

Performance deficiencies of the fire brigade or individual brigade members are remedied by scheduling additional training.

3) Annual Fire Brigade Training

Annual Fire Brigade Training will be held for the fire brigade on the proper method of fighting various types of fires similar in magnitude, complexity, and difficulty as those that could occur. This training will include actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions.

Annual briefings are provided to the local fire departments to assure their continued understanding of their role in the event of a fire emergency at the plant. The annual briefings are required for only those local fire departments that have aid agreements with the plant.

9.4 Fire fighting Equipment

Fire fighting equipment is provided throughout the plant. The availability of fire fighting equipment is such that delays in obtaining equipment by the fire brigade for fire emergencies will be minimized.

Fire fighting equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability.

Examples of the types of fire fighting equipment available are as follows:

- mobile apparatus
- portable ventilation equipment
- fire extinguishers
- self-contained breathing apparatus and reserve air bottles
- fire hose
- nozzles, gated wyes, fittings, and foam applicators
- personal protective equipment such as turn-out coats, boots, gloves, and helmets
- communication equipment
- portable lights
- ladders for fire fighting use

9.5 Fire Emergency Procedures and Pre-fire Plans

Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering a fire and actions considered by the emergency response organization. Included in these procedures are operational instructions for response to the fire detection system annunciation. These procedures provide different levels of response based on the type of alarms received. An annunciation may or may not carry the same level of response as the report of a fire by site personnel.

Pre-fire plans are developed to support fire fighting activities in safety-related areas, in fire safe shutdown system areas, and areas which may present a hazard to safety-related or FSSD equipment. Pre-fire plans are not intended to establish a procedure or step-by-step process but to provide guidance, depending upon the particular circumstances, to aid in fire fighting efforts. It is recognized that many different fire fighting techniques or strategies exist which would be acceptable for fire suppression efforts.

The pre-fire plans include the following information, as appropriate:

- Identification of plant equipment
- Access and egress routes for fire areas
- Fire fighting strategy and tactics
- Location of fire protection features
- Identification of special fire, toxic material, and radiological hazards
- Special consideration of hazards
- Ventilation methodology

Safe shutdown procedures are available in the event a fire occurs in areas of the plant containing safety-related or FSSD equipment.

10.0 CONTROL OF COMBUSTIBLES

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion.

The use and application of combustible materials at SQN are controlled utilizing the following methods:

- Instructions/guidelines provided during general employee training/orientation programs.
- The chemical traffic control program.
- Periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization.
- Design/modification review and installation process.
- Administrative procedures.

The fire protection organization performs a periodic fire safety inspection of the safety-related areas of the plant to identify and minimize potential fire hazards.

The use and handling of combustible materials such as fire retardant-treated lumber, paper, plastic, and flammable/combustible gases and liquids are controlled in safety-related areas. The use of untreated lumber in safety-related areas requires specific approval of the fire protection organization.

Combustible materials (e.g., combustible packing materials, flammable and combustible liquids) necessary for maintenance work activities are properly stored at the conclusion of the work activity, unless alternative conditions are implemented in accordance with administrative procedures.

The control of hazardous waste and hazardous materials is conducted in accordance with the chemical control and hazardous material processes. Materials containing or collecting significant radioactivity are stored in closed metal containers in the radwaste area.

Design considerations in the control of combustibles is utilized when appropriate. For example, these considerations include the application of noncombustible or limited combustible construction materials or components, use of noncombustible fluids in operating equipment, dikes, or containments provided for equipment containing combustible liquids, etc.

11.0 CONTROL OF IGNITION SOURCES

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit.

Fire watch requirements are established for all ignition source work activities that are performed in safety-related areas.

12.0 DESCRIPTION OF FIRE PROTECTION SYSTEMS AND FEATURES

Fire protection systems and related features consist of the following subsystems:

- water supply
- standpipes, hoses and hydrants
- automatic and manual fire suppression equipment
- fire detection
- lightning protection, emergency lighting, and communications
- reactor coolant pump lube oil collection system, and
- fire-rated assemblies

The following subsections are summary discussions of these fire protection systems and related features.

12.1 Water Supply

The High Pressure Fire Protection (HPFP) system water supply is common to both units and consists of one electric motor driven fire pump and one diesel engine driven fire pump. Each pump takes suction from its own 300,000 gallon potable water storage tank which is supplied by the local municipal utility. The pump supply piping is interconnected such that either or both pumps can take suction from either tank. The electric pump is the lead pump and the diesel pump is a 100% backup. Each pump is capable of supplying the water required for all Appendix R fires and most general plant fires. The pumps are located in the HPFP pump house in their own room separated by a 3 hour fire wall. Each pump is connected to the HPFP system looped yard main by a separate supply line which can be isolated.

The HPFP system is normally pressurized by a cross connect to the fire tank potable water supply and two jockey pumps which automatically start if the potable water supply cannot maintain system header pressure. The cross connect is downstream of the potable water backflow preventer and contains a pressure regulator and check valve to isolate the fire protection system from a failure of the potable water supply and prevent recirculation back to the fire tanks during fire pump operation. The fire pumps automatically start on low HPFP system header pressure. If the HPFP header pressure drops below the fire pump start pressure for approximately 1 to 3 seconds the electric fire pump will start. If the pressure remains below the fire pump start pressure for approximately 8 to 10 seconds the diesel fire pump will start. The fire pumps can be manually started locally or from the main control room but can only be shut off from the local control panel.

The electric fire pump is powered from the 6900VAC Yard Area Common Board. The diesel fire pump and instrumentation is powered by a battery system and will operate on a loss of AC power. The electric fire pump has control room alarms which indicate pump motor running, loss of line power, phase reversal, and motor failed to start. The diesel fire pump has control room alarms which indicate engine running, engine failed to start, and controller not in automatic start position. Each pump also has a common alarm in the control room for adverse environmental conditions and equipment failures effecting pump operation.

The HPFP system is also connected to the two fire/flood mode pumps (old fire pumps) which can be utilized by opening the normally closed valves which isolate them from the system. These are electric pumps which take suction from the forebay and are powered from separate (Class 1E) 480 VAC shutdown boards. These pumps are not required for the HPFP system to fulfill its design bases

Strainers are provided at the IPS and inside the AB on the fire pump headers. These strainers were installed because the original system was supplied by river water. The strainer at the IPS is normally bypassed unless a fire/flood mode pump is being used to supply river water to the HPFP system.

In addition, fire protection water strainers are located in the flow path just upstream of the flow control valves for the various sprinkler and water spray systems supplying safety-related areas. The fire pump strainers and the flow path strainers are inspected and maintained in accordance with the SQN Periodic Inspection Program. A fire protection water distribution system is provided to serve both units. Sectional isolation valves are provided so that maintenance may be performed on portions of the loop while maintaining fire fighting capability.

The sectional isolation valves in the underground loop are locked or sealed in position and surveillance is performed to ensure proper system alignment. The fire protection water distribution system is cross-tied between units.

12.2 Standpipes, Hose Stations , and Hydrants

Interior manual hose installations are provided throughout the plant typically as back up for the automatic suppression systems and, in some cases, as the primary suppression system.

Selected hazards in the Reactor Buildings have automatic suppression systems as primary protection. These hazards include closed head, pre-action water spray systems installed for each reactor coolant pump (RCP) and pre-action sprinklers in the annulus that serve as water spray on select cable concentrations and to prevent specific cable interactions. These automatic suppression systems are the primary suppression for these hazards with the standpipes as the backup.

For lower containment areas of the Reactor Buildings, the primary suppression system is the Reactor Building standpipes with the Auxiliary Building standpipes serving as the backup system. Upper containment areas utilize auxiliary building hose stations.

The standpipe systems in the IPS serve as the primary system, with yard hydrants and mobile apparatus providing the backup system. Hydrants are appropriately located throughout the yard in the vicinity of the IPS.

The ERCW Pumping Station is provided with two independent standpipe systems (supplied by train A and Train B ERCW Pumps).

Selected areas in the Diesel Generator Building (DGB) have automatic CO_2 and pre-action sprinkler systems as primary protection with the standpipe system serving as the backup system in these areas. In areas of the DGB without automatic suppression, the standpipe system serves as the primary system, with yard hydrants providing the backup system.

Class II and III Hose stations are equipped with nozzles rated for the hazards present and with a sufficient amount of hose to support fire fighting needs in that area. Water spray or fog is not permitted in the new fuel storage vault. Portable extinguishers are acceptable in this area due to the low combustible loading and the metal covers over the new fuel vault.

Hose station equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address equipment concerns relative to personnel safety, ALARA practices, and logistical response needs.

The auxiliary building, control building, diesel generator building, intake pumping station, and ERCW pumping station are provided with a wet standpipe system. These systems have supply valves open and water pressure to the hose rack isolation valve. The Reactor Building (including the Annulus) is provided with a dry standpipe system. The standpipe systems within the RB are normally dry and are arranged to admit water into the systems through manual operation of push buttons located at each hose station.

The reactor building systems are controlled by electrically or manually operated flow control valves which are located in the AB. These systems are provided with automatic containment isolation capabilities for primary containment to address nuclear safety concerns where appropriate. In case a fire in primary containment causes a spurious containment isolation signal, flow to these systems can be reestablished by resetting the phase A isolation signal and opening the containment isolation valves.

12.3 Automatic Fire Suppression Systems

The automatic fire suppression systems are designed to extinguish a fire or control and minimize the effects of a fire until the fire brigade can respond and extinguish it. The automatic suppression systems consist of water based systems and total flooding CO_2 systems. In addition, manually actuated fixed water suppression systems are also addressed in this section.

There are typically four types of automatic suppression systems provided in safety-related areas at SQN:

a. automatic pre-action sprinkler systems
b. automatic fire suppression systems with closed water spray heads
c. automatic total flooding CO_2 systems
d. automatic pre-action water spray systems (see Part VI)

The annulus area of the Reactor Building has automatic pre-action sprinklers that serve as water spray on select cable concentrations and to address specific cable interactions.

12.3.1 Pre-action Sprinkler Systems

Automatic pre-action sprinkler systems generally are provided in areas where it is important to prevent accidental discharge of water. In a pre-action sprinkler system, the piping network is maintained dry until water is needed for fire suppression. A deluge valve (sometimes referred to as a pre-action valve when used in a pre-action system) is used to control the water when the water is introduced into the piping network.

Operation of the pre-action sprinkler system is initiated by a signal from a detection system in the protected area. This signal causes the pre-action valve to open and fill the piping network. Actuation can also be initiated manually by mechanical operation at the pre-action valve. Selected pre-action sprinkler systems have manual actuation stations at strategic locations remote from the pre-action valve.

Water is then applied to the fire when the heat from the fire melts the fusible element in the sprinkler head. Water flow is stopped by manually closing the associated isolation valve.

12.3.2 Fire Suppression Systems with Closed Water Spray Heads

See Part VI.

12.3.3 Carbon Dioxide Suppression Systems

Automatic total flooding CO_2 suppression systems have been provided for the Auxiliary Instrument Rooms and Computer Room in the Control Building, and the Lube Oil Storage Room, each Diesel Engine Room (4), Fuel Oil Transfer Room, and each 480-V Board Rooms (4) in the Diesel Generator Building. See Part VI.

A signal from either the fire detection system or a push button station activates the area alarms, CO_2 discharge timer which actuates the master control valve and the area selector valve permitting the CO_2 to be discharged into the selected area. In addition, the system can be manually operated via the electro-manual pilot valve.

Personnel safety is addressed by providing the pre-discharge alarm to notify anyone in the area that CO_2 is going to be discharged and by the addition of an odorizer to the CO_2 to warn personnel that CO_2 has been discharged. Additionally, abort switches are strategically located in the Unit 1 Auxiliary Instrument Room (685.0-C1), Unit 2 Auxiliary Instrument Room (685.0-C4), and Computer Room (685.0-C3) to allow for the discharge to be terminated by personnel in the area.

Actuation of the CO_2 system causes selective closure of dampers and doors to the area protected. HVAC fans to the protected areas in the diesel generator building are shutdown. This prevents spread of the fire and ensures that the minimum concentration of CO_2 is maintained. The duration of the discharge is determined by the area requirements and is controlled by the discharge timer.

The carbon dioxide system providing protection for the diesel generator building is stored in a tank in the diesel generator building. The diesel generator units are protected from the effects of a postulated failure of this storage tank by an 18-in thick reinforced concrete wall. Therefore, any missiles or pressure buildup generated by a rupture of the carbon dioxide storage tank would not damage safety-related equipment. The vent path for the storage tank compartment is through one set of double doors into a stairwell then, if needed, through another set of double doors which open to the atmosphere from the stairwell.

Carbon dioxide for the powerhouse areas is supplied from another storage tank in an underground vault in the yard; therefore, rupture or explosion of the tank cannot pose a threat to any safety-related structure.

12.3.4 Pre-action Water Spray Systems

See Part VI.

12.4 Manual Suppression Systems and Features

12.4.1 Portable Extinguishers

Portable fire extinguishers of a size and type compatible with specific hazards are located throughout the plant. Extinguishers may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address personnel safety concerns, ALARA practices, and logistical response needs.

12.4.2 Manual Sprinkler Systems

Manually activated sprinkler systems are provided for the Post Accident System facility, Post Accident System filters, and the 125-volt vital battery and battery board rooms I, II, III, and IV. The piping network isolation valve is maintained in the closed position. Personnel are alerted to a problem in these areas by the fire detection system. After confirming there is a fire, personnel then open the appropriate isolation valve to allow water to the system. Water is applied to the fire when the heat from the fire melts the fusible element in the sprinkler head.

In the event of a fire in the elevation 669' corridor of the Control Building, manual initiation of the pre-action valve is required.

12.5 Fire Detection Systems

Fire detection is installed to provide for prompt detection of a fire in its incipient stage and provide early warning capability. Prompt detection of a fire will reduce the potential for damage to structures, systems and equipment and is an important part of the overall fire protection program at SQN. The fire detection systems at SQN are designed to be operable with or without offsite power.

The fire detection systems consist of initiating devices, proprietary protective signaling devices, local control panels, remote transmitter/receiver units which provide remote multiplex (MUX) functions, and computerized multiplex central control equipment.

The system processes the following signal types:

1. Alarm - A signal indicating the actuation of smoke or heat detectors or the sensing of flow through fire suppression systems. Also, some suppression supervision monitoring devices transmit an alarm signal.

2. Trouble - A signal indicating the occurrence of a fault condition in the proprietary protective signaling system.

3. Supervisory - A signal indicating a change in status of a zone. Several zones at Sequoyah Nuclear Plant are monitored with a supervision module that indicates a change in the status of the local zone without impacting normal operations of its associated local panel. This signal is indicated on the alarm console as a trouble condition.

One of the two central processor units (CPU) of the computerized multiplex central control equipment located in the main control room communicates with the local control panels via the remote transmitter/receiver units over looped circuits. Only one of the CPUs provided is required to be OPERABLE. A second CPU is installed and available for use in the event that the operating CPU fails. The CPU polls each panel connected to the multiplexor loop and has the capability to transmit panel commands and receive data from the panels.

When an initiating device changes from normal to a trouble or alarm status, it is detected at the local control panel and the remote transmitter/receiver will transmit this status change.

The status change is evaluated by the CPU and visual and audible indications are provided. The computerized multiplex central control equipment is located in a constantly attended location.

Where detection is provided for the protection of safety-related or FSSD equipment, Class A, four wire, supervised circuits link the fire detectors to the local control panels.

A status change generally results in the following system responses:

1. Audible and visual annunciation by the computerized multiplex central control equipment. This annunciation includes identification of the zone/area alarm panel location and the time of receipt of the status change on a cathode ray tube (CRT) and a printer. Trouble indication is for the panel only. The local panel provides further details on the alarm condition.

2. Illumination of indicating lamps on the local control panel indicating the status change.

3. Actuation of local control panel circuits for the control of automatic suppression systems, fire pumps, fire dampers, or ventilation equipment as appropriate for selected alarm status changes.

4. An alarm status change can be reset at the local control panel. Local control panel reset, in safety-related areas, can also be achieved through the computerized multiplex central control equipment.

A redundant printer is located in the Unit 2 Auxiliary Instrument Room.

The fire detection system for safety-related areas is comprised of different types of devices, components, or parts that provide the system functions of detection, annunciation, and/or activation of automatic suppression systems. The devices used are:

1. Smoke Detectors
    a. Ionization
    b. Photoelectric

2. Thermal Detectors

    The thermal detectors are the rate compensation/fixed temperature type and are self restoring. They have temperature ratings appropriate for the area environment. Protecto-wire has been added to the cable trays in selected areas of the 480VAC Shutdown Board Rooms. This thermal detector is not self-restoring.

3. Air Duct Detectors

    The air duct detectors are specifically designed to sense the presence of smoke or combustion products in HVAC ducts.

4. Monitoring Devices

The fire detection system utilizes the following devices to monitor the fire suppression systems status.

a. Pressure Switch - piping integrity
b. Pressure Switch - for water flow
c. Pressure Switch - CO_2 discharge
d. Relay contacts - CO_2 abort and disablement

5. Manual Pull Stations

6. Power Supply

Two sources of 120V AC power are provided to the portion of the fire detection system protecting the safety-related equipment. The primary power supply is from Class 1E power sources with a high degree of reliability and adequate capacity for the intended service. The standby power is from the diesel generator.

Electrical isolation is provided between the fire detection system and the Class 1E power source from which it is supplied.

12.6 Lightning Protection

The basic principle to protecting life and property from damage or loss due to lightning is to provide a direct low impedance path for the lightning to travel to ground rather than through structures and/or equipment.

The lightning protection system consists of three basic parts which provide the low impedance path:

1. The air terminals on roofs and other elevated locations.
2. The ground grid.
3. The conductors connecting the air terminals to the ground grid.

12.7 Emergency Lighting

See Part V.

12.8 Communications

There are several means of communication available to Operations staff such as telephones; code, alarm, and paging; sound powered phones; and two-way radios. The in-plant radio repeater system will be the primary means of communication for performing manual actions and for the fire brigade use.

The in-plant radio repeater system consists of multiple VHF radio repeaters, remote control units, portable radios, and redundant antenna systems.

A sound powered phone system connects the auxiliary control room and various local control stations to supplement the VHF radio during alternative shutdown.

12.9 Reactor Coolant Pump Oil Collection

See Part V.

12.10 Fire-Rated Assemblies

Fire rated assemblies at SQN are part of the passive fire protection features which ensure that the function of one set of redundant fire safe shutdown components necessary to achieve and maintain FSSD remains free of fire damage. Fire rated assemblies consist of fire barriers, Electrical Raceway Fire Barrier Systems (ERFBS), equipment hatches and stairwells, fire doors, fire dampers, radiant energy shields, penetration seals, walls, floors, and ceilings. Fire barriers and fire doors are identified on the compartmentation drawings in Part X of the FPR.

12.10.1 Walls, Floors, and Ceilings

Fire areas are separated by 1.0, 1.5- or 3-hour equivalent fire barriers that are bounded by UL rated designs or equivalent. Rooms within each fire area may be separated from other rooms in the same area by FSSD or non-FSSD fire barriers. Where fire barriers are used to separate rooms in the same area, the barriers have equivalent 1.0 or 1.5- hour fire ratings. If the FSSD separation between rooms in the same fire area is less than 3-hour, then automatic suppression and detection systems are provided or deviations justified (see Part VII for the discussion of deviations and evaluations).

12.10.2 Raceway Protection

Cable raceways that require separation by Electrical Raceway Fire Barrier Systems (ERFBS) are provided with one-hour rated ERFBS (subject to Thermo-Lag upgrade and deviation request) and automatic suppression and detection in the area (except as allowed by approved deviations). Inside the reactor building, which includes primary containment and secondary containment (i.e., annulus), a combination of spatial separation greater than 20 feet, radiant energy shields and automatic detection and suppression are used to obtain separation where fire could potentially damage redundant safe shutdown components.

12.10.3 Equipment Hatches and Stairwell

Equipment hatches in floor or ceiling fire barriers fall into three categories:

a) Pre-cast concrete plugs which overlap mating surfaces for support - These plugs are usually associated with radiation shielding and provide a fire barrier equivalent to the floor or ceiling in which they are located.

b) Steel covers that overlap mating surfaces for support - These covers are of substantial construction and provide an effective barrier to prevent fire from propagating from one side of the barrier to the other.

However, since they are not fire rated, they are either provided with a fire barrier coating, evaluated in accordance with GL 86-10, or redundant safe shutdown components on either side have been separated from each other by a cumulative horizontal distance of 20 or more feet. In either case, automatic fire suppression and detection are provided on both sides of the equipment hatch cover, if appropriate, or an engineering evaluation has been performed See Part VII for justifications of deviations and/or evaluations.

c) Open hatches and stairwells - Redundant safe shutdown components located on each side of the opening have been identified. If separated by less than a cumulative distance of 20 feet horizontally, either the hatch/stairwell has been provided with a water curtain to separate elevations, or a one hour fire barrier has been provided on the cables for one of the redundant paths. In either case automatic fire suppression and detection has been provided on both sides of the opening, except for the refueling area and the 653 ft elevation of the Auxiliary Building. See Part VII for justifications for deviations and/or evaluations.

12.10.4 Fire Doors

Fire door assemblies (doors, frames, and hardware) are generally provided in door openings in required fire barriers. These assemblies are UL listed as either "A" label (3-hour rated) or "B" label (1-1/2 hour rated). "A" label doors are provided in 3-hour or less rated fire barriers and "B" label doors are provided in barriers that require a 2-hour or less fire rating.

Sliding fire doors are provided in selected locations. These sliding fire doors are closed by heat melting a fusible link and in selected CO_2 protected areas, a CO_2 system pressure-activated, or electrical release, or a combination of both.

In some cases, such as air lock doors, equipment doors, submarine type doors, etc., the doors cannot be purchased as labeled fire doors. These doors have been evaluated by a Fire Protection Engineer for their ability to prevent the propagation of a fire. These evaluations are documented in Part VII, Deviations, or in other Engineering documentation.

Modifications to fire doors must be within accepted criteria or approved by a Fire Protection Engineer. Fire doors can be repaired under defined criteria and with the approval of the Fire Protection Engineer through the design output process.

12.10.5 Fire Dampers

Fire dampers are normally provided in ventilation openings in fire barriers and in HVAC ducts that penetrate required fire barriers to prevent the propagation of a fire through the barrier. Some duct penetrations, shown on the compartmentation drawings as unprotected openings without dampers, have been evaluated as acceptable barrier openings, acceptable partial barriers, or equivalent fire barriers. In some cases, the fire damper is also used to isolate an area prior to CO_2 discharge. Fire dampers are provided with appropriately rated fusible links based on the ambient temperatures in the location.

Some dampers are also supplied with electro - thermo links (ETL) that are electrically activated in response to a signal from the fire detection system. The fire dampers provided with CO_2 suppression system isolation capability are actuated by CO_2 system pressure activated release mechanism and/or by thermal link. Fire dampers in safety-related HVAC systems may have double fusible links installed if required by analysis.

12.10.6 Penetration Seals

When plant commodities (i.e., pipe, cable trays, conduits, etc.) must pass through required fire barriers, the openings are provided with seals that meet or exceed the fire protection requirements of the barrier. The majority of mechanical and electrical penetration seals used at Sequoyah have been bounded by fire tests. For the remaining population of penetration seals, evaluations have been performed in accordance with USNRC Generic Letter 86-10 to determine the acceptability of the seals in their "as-built" configuration. The fire protection design basis for the penetration seal program is contained in Reference 4.2.9, System Description Document N2-302-400, "Penetration Seals" (formerly issued as "SQN Penetration Seal Program Assessment Report, No. 0006-00902-01"). The system description provides: verification of conformance to the required standards for each of the fire endurance tests used to qualify the penetration seals; schematics and evaluations for the limiting parameters of each typical detail; and general discussions of pertinent penetration seal issues.

In addition to fire protection capabilities, some penetration seals may be required to meet other plant design bases requirements such as radiation shielding, HVAC pressure differential, and/or flood.

12.10.6.1 Electrical Penetrations

Conduit penetrations typically require only internal seals since most conduit penetrations were poured-in-place during plant construction. Internal seal materials, design, and locations in walls and floor/ceiling assemblies have been evaluated as equivalent to tested configurations If a conduit requires an external seal (e.g., the conduit passed through a sleeve larger than the conduit), the external seal will meet the same criteria as stated in the above paragraph. The criteria for internal conduit seals are provided by site-specific drawings.

13.0 FIRE PROTECTION SYSTEM IMPAIRMENTS AND COMPENSATORY ACTIONS

Fire protection impairments are controlled to maximize the availability of the active and passive fire protection systems and features. Fire protection systems and features are intended to remain fully operational to the maximum extent possible. However, it is expected that outages or impairments will occur to support plant or fire protection-related modifications or maintenance.

Compensatory actions for impaired fire protection systems are defined in the applicable sections of this plan. When fire watches are assigned as compensatory measurers for fire protection systems or features, their principle purpose/responsibilities are to:

1. Detect fire or conditions of potential fire (i.e. smoke, flames, etc.).
2. Communicate observation of detected fire or conditions of potential fire to the control room.
3. Notify personnel in the immediate area of the fire to evacuate the immediate area, if time permits.

Alternate compensatory actions for fire watch such as closed circuit television may be utilized on a case by case basis. This alternative action is considered when the primary methods create further hazards or represent personnel safety concerns.

A summary of each of these primary and alternate compensatory actions are as follows:

A. Fire Watch - Continuous (Primary)

A continuous fire watch is required when the potential exists for a single fire to damage redundant trains of the minimum fire safe shutdown (FSSD) equipment necessary to achieve and maintain cold shutdown conditions in the event of a fire. 10CFR Appendix R, Section III.G.1 states: "Fire protection features shall be provided for structures, systems and components important to safe shutdown. These features shall be capable of limiting fire damage so that:
a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and
b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours."

A single fire is a fire that is postulated to occur in any plant area that is separated from other plant areas by boundary fire barriers or substantial spatial separation. Each area of the plant is assigned a fire area or fire zone designation such as FAA-1, FAA-2, FAC-1, FAC-2, etc. As an example, a fire is postulated to occur in FAA-1 or FAA-2 but not in FAA-1 and FAA-2 simultaneously.

The fire areas/zones are separated from each other by minimum 1-1/2 hour fire rated boundaries, with approved deviations, or in some cases, substantial spatial separation such as between the Auxiliary Building and the CCW Pump Station or the ERCW Pump Station. Therefore, an hourly fire watch is considered adequate detection capability to prevent an otherwise undetected fire from breaching the boundary fire barriers and spreading to an adjacent fire area/zone where redundant FSSD equipment may be located.

When redundant trains of FSSD equipment are located within the same fire area/zone the protection that has generally been provided is 1 hour rated Thermo-Lag Electrical Raceway Fire Barrier Systems (ERFBS), or a minimum of 20 feet of horizontal separation with no intervening combustibles, and an automatic fire detection and suppression system. Other protection arrangements for redundant FSSD equipment located in the same fire area/zone are described in approved deviations to 10CFR50 Appendix R requirements (i.e. Counting Room). In all of these cases, an hourly fire watch is not considered adequate detection capability to prevent an otherwise undetected fire from damaging both trains of redundant FSSD equipment.

A continuous fire watch requires that individual(s) inspect the specified area at least once every 15 minutes with a margin of 5 minutes.

B. Fire Watch - Roving (Primary)

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

C. Closed Circuit Television -CCTV (Alternative)

CCTV equipment consists of CCTV cameras and monitors. Cameras may be placed in more than one room or more than one elevation of the plant. CCTV systems are similar to the ones used by other utilities for monitoring of inoperable fire barriers as well as CCTVs previously utilized at Browns Ferry Nuclear Plant in inaccessible tunnels. An evaluation will be performed by the plant fire protection staff and documented with the impairment process (appropriate administrative process) or work initiation document for use of CCTV equipment (cameras and monitors) to demonstrate technical equivalency to standard compensatory actions identified in Section 14, "Fire Protection Systems and Features Operating Requirements (OR)."

CCTV monitors are monitored by trained personnel at a frequency consistent with standard compensatory actions identified in Section 14, "Fire Protection Systems and Features Operating Requirements (OR)." CCTV is used in instances where conditions may present risks to personal safety, operational conditions in high heat areas such as the main steam vault, or ALARA concerns in high radiation areas preclude using a human fire watch in the area.

D. Procedural Controls (Strict Administrative Measures)

Procedural controls as discussed in GL 91-18 may be utilized as compensatory measures to require immediate actions to be taken to restore a system or feature back to OPERABLE status in the event of a fire emergency in an affected area. These controls will further require strict administrative measures to ensure the system or feature is not left unattended unless either the system or feature is restored back to operable status or a fire watch is established. In the event procedural controls are utilized as compensatory measures, an evaluation will be performed by the plant fire protection staff and documented as part of the affected procedure change and revision process.

The evaluation will demonstrate the technical equivalency to standard compensatory actions identified in Section 14, *Fire Protection Systems and Features Operating Requirements (OR)*.

SECTION 14.0 - OPERATING REQUIREMENTS
TABLE OF CONTENTS

14.0 FIRE PROTECTION SYSTEMS AND FEATURES OPERATING REQUIREMENTS (OR) AND SURVEILLANCE REQUIREMENTS (SR)

The OR established in this section have been developed to ensure adequate fire protection capability is available and maintained, to detect, control, and extinguish fires occurring in any portion of the plant where safety-related or Fire Safe Shutdown (FSSD) equipment are located. Calculation SQN-SQS2-203, "Evaluation of Fire Safe Shutdown Equipment for IE Notice 97-048," addresses equipment required for FSSD which is not bounded by existing Technical Specifications. Since these components are not fire protection equipment, they are also not controlled by an existing FOR Based on a review of each component determined to be required for FSSD, the calculation determines that the FSSD equipment not covered through existing Surveillance Instructions is equipment essential for normal operation of the plant, and as such, receives high priority for maintenance and return to operable status, which will ensure that they are available for FSSD purposes.

Fire protection systems and features at SQN are not assumed to be operable to mitigate the consequences of a Design Basis Accident (DBA) or plant transient in conjunction with a fire. The bases for this assumption are contained in Section I of Appendix R which states that the need to limit fire damage to systems required to achieve and maintain FSSD conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of DBAs. As a result, Section L of 10CFR50, Appendix R, identifies that fire protection features must be capable of limiting fire damage so that:

1. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room, auxiliary control room, or emergency control stations is free of fire damage; and

2. Systems necessary to achieve and maintain cold shutdown from either the control room, auxiliary control room, or emergency control stations can be repaired within 72 hours.

3. Alternate shutdown capability is provided when needed to achieve and maintain cold shutdown within 72 hours.

Testing of the fire protection systems involve manually disabling portions of them to prevent unwanted responses. These responses can be in the form of excessive starting of pumps, discharging water in a radiologically controlled area, excessive alarming of devices/components, and undesirable actuation of systems/components. In many cases when test personnel are actively performing the test (system under control of test performers), compensatory measures (i.e., fire watches) will not be required. The test personnel may be credited for returning the system under test to normal operational alignment in the event of a fire that would require the system to function. These situations are controlled by the procedure governing the test or by other administrative controls established for the performance of the test. Factors considered in determining when test personnel may be credited for manual action to restore a system to operational status include ability of test personnel to recognize input signals, communications between test personnel, and timing required to restore the system to functional status.

14.0.1 Compliance with the Operating Requirements (OR) contained in the succeeding Specifications is required during the APPLICABILITY or other conditions specified therein; except that upon failure to meet the Limiting Conditions for Operations, the associated ACTION requirements shall be met.

14.0.2 Noncompliance with a Specification shall exist when the requirements of the Operating Requirements (OR) and associated ACTION requirements are not met within the specified time intervals. If the OR is restored prior to expiration of the specified time intervals, completion of the ACTION requirements is not required.

14.0.3 Entry into an OPERATIONAL MODE or other specified condition may be made with reliance on provisions contained in the ACTION requirements. This provision shall not prevent passage through OPERATIONAL MODES as required to comply with ACTION requirements.

14.0.4 When a system, subsystem, train, component or devise is determined to be inoperable solely because its emergency power source in inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of its applicable Limiting Condition of Operation, provided: (1) its corresponding normal or emergency power source is OPERABLE; and (2) all of its redundant system(s), subsystem(s), trains(s), component(s) and device(s) are OPERABLE, or likewise satisfy the requirements of this Specification.

14.0.5 Surveillance Requirements (SR) shall be met during the OPERATIONAL MODES or other conditions specified for individual Limiting Conditions for Operations unless otherwise stated in an individual SR.

14.0.6 Each SR shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed twenty-five percent (25%) of the specified surveillance interval.

14.0.7 Failure to perform a SR within the allowed surveillance interval, defined by Section 14.0.5, shall constitute noncompliance with the OPERABILITY requirements for a Limiting Condition of Operation. The time limits of the ACTION requirements are applicable at the time it is identified that a SR has not been performed. The ACTION requirements may be delayed for up to twenty-four (24) hours to permit the completion of the surveillance when the allowable outage time limits of the ACTION requirements are less than twenty-four (24) hours. SR's do not have to be performed on inoperable equipment.

14.1 FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 As a minimum, the fire detection instrumentation for each fire detection zone shown in Table 3.3-11 shall be OPERABLE

APPLICABILITY: Whenever equipment protected by the fire detection instrument is required to be OPERABLE.*

ACTION:

a. With the alarm function associated with the fire detection instruments INOPERABLE:

1. For areas other than Primary Containment:

   a For fire detection instrumentation that is associated with fire suppression systems required to be OPERABLE per LCO 3.7.11.2 or 3.7.11.3, within one hour establish a continuous fire watch in areas where redundant systems or components could be damaged; for other areas, establish an hourly fire watch patrol.

   b. For fire detection instrumentation that is not associated with fire suppression systems required to be OPERABLE per Section 3.7.11.2 or 3.7.11.3, within one hour establish an hourly fire watch patrol.

   c. Restore the inoperable instrument(s) to OPERABLE status within 14 days. If not restored to OPERABLE within 14 days, perform corrective action/reportability reviews in accordance with site administrative procedures.

2. For inoperable equipment inside Primary Containment, restore the inoperable instrument(s) to OPERABLE status within 14 days. If not restored to OPERABLE within 14 days, perform corrective action/reportability reviews in accordance with site administrative procedures.

b. With the automatic suppression system actuation function of the fire detection instrumentation INOPERABLE , enter the applicable LCO of Section 3.7.11.2 and/or 3.7.11.3 for those automatic suppression systems with no automatic actuation available.

c. If the circuit supervision verified by SR 4.3.3.8.2 fails or a loop failure trouble is annunciated, correct the problem within 14 days. If not corrected within 14 days, perform corrective action/reportability reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS (SR)

4.3.3.8.1 Each of the above required fire detection instruments which are accessible and do not require removing plant equipment from service shall be demonstrated OPERABLE at least once per 12 months by performance of a CHANNEL FUNCTIONAL TEST. Fire detection instruments which are not accessible or which require removing plant equipment from service during plant operation shall be demonstrated OPERABLE by the performance of a CHANNEL FUNCTIONAL TEST at least once per 18 months.

4.3.3.8.2 The supervision of the circuits between required local panels and the alarm receiving console shall be demonstrated OPERABLE at least once per 6 months.

4.3.3.8.3 Each zone serving required fire detection instruments(s) and the non-supervised circuits between the local fire protection panels and actuated fire suppression equipment shall be demonstrated OPERABLE at least once per 6 months.

---

* The fire detection instruments located within the containment are not required to be OPERABLE during the performance of Type A Containment Leakage Rate Tests.

TABLE 3.3-11 Rev. 11
MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
1	Diesel Gen. Rm. 2B-B, El. 722			5	
2	Diesel Gen. Rm. 2B-B, El. 722			5	
3	Diesel Gen. Rm. 1B-B, El. 722			5	
4	Diesel Gen. Rm. 1B-B, El. 722			5	
5	Diesel Gen. Rm. 2A-A, El. 722			5	
6	Diesel Gen. Rm. 2A-A, El. 722			5	
7	Diesel Gen. Rm. 1A-A, El. 722			5	
8	Diesel Gen. Rm. 1A-A, El. 722			5	
9	Lube Oil Storage Rm. El. 722			1	
10	Lube Oil Storage Rm. El. 722			1	
11	Fuel Oil Transfer Rm. El. 722			1	
12	Fuel Oil Transfer Rm. El. 722			1	
13	Diesel Gen. Corridor, El. 722			6	
14	Air Intake & Exhaust Rm. 2B, El. 740.5			9	
15	Air Intake & Exhaust Rm. 1B, El. 740.5			9	
16	Air Intake & Exhaust Rm. 2A, El. 740.5			9	
17	Air Intake & Exhaust Rm. 1A, El. 740.5			9	
18	Diesel Gen. 2B-B Relay Bd., El. 722	3			
19	Diesel Gen. 1B-B Relay Bd., El. 722	3			
20	Diesel Gen. 2A-A Relay Bd., El. 722	3			
21	Diesel Gen. 1A-A Relay Bd., El. 722	3			
22	Diesel Gen. Bd. Rm 2B-B, El. 740.5	2			
23	Diesel Gen. Bd. Rm 2B-B, El. 740.5			2	
24	Diesel Gen. Bd. Rm. 1B-B, El. 740 5	2			
25	Diesel Gen. Bd. Rm. 1B-B, El. 740.5			2	
26	Diesel Gen. Bd Rm. 2A-A, El. 740.5	2			
27	Diesel Gen. Bd Rm. 2A-A, El. 740.5			2	
28	Diesel Gen. Bd. Rm. 1A-A, El. 740.5	2			
29	Diesel Gen. Bd. Rm. 1A-A, El. 740.5			2	
30	Cable Spreading Rm. C7-C11, El. 706	14			
31	Cable Spreading Rm. C7-C11, El. 706	14			
32	Cable Spreading Rm. C7-C11, El. 706	14			
33	Cable Spreading Rm. C7-C11, El. 706	14			
34	Cable Spreading Rm. C3-C7, El. 706	14			
35	Cable Spreading Rm. C3-C7, El. 706	14			
39	Cont. Spray Pump 1A-A, El. 653	2			
40	Cont. Spray Pump 1B-B, El. 653	2			
41	Cont. Spray Pump 2A-A, El. 653	2			
42	Cont. Spray Pump 2B-B, El. 653	2			
43	RHR Pump 1A-A, El. 653	2			
44	RHR Pump 1B-B, El. 653	2			
45	RHR Pump 2A-A, El 653	2			
46	RHR Pump 2B-B, El. 653	2			
47	Aux. Bldg. Corridor, El. 653	10			
48	Corridor, Control Bldg. El. 669	4			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
49	Corridor, Control Bldg. E1. 669	4			
50	Mech. Equip. Rm. Col. C1, E1. 669	2			
51	Mech. Equip. Rm. Col. C1, E1. 669			2	
52	Mech. Equip. Rm. Col. C3, E1. 669	2			
53	Mech. Equip. Rm. Col. C3, E1. 669			2	
54	250-V Batt. Rm. 1, E1. 669	3			
55	250-V Batt. Rm. 1, E1. 669			3	
56	250-V Batt. Bd Rm. 1, E1. 669	2			
57	250-V Batt. Bd. Rm. 1, E1. 669	2			
58	250-V Batt. Bd. Rm. 2, E1. 669	2			
59	250-V Batt. Bd Rm. 2, E1. 669	2			
60	250-V Batt. Rm. 2, E1. 669	3			
61	250-V Batt. Rm. 2, E1. 669			3	
62	24-V & 48-V Batt. Rm. E1. 669	3			
63	24-V & 48-V Batt. Rm. E1. 669			3	
64	24-V & 48-V Batt. Bd. Rm , E1. 669	2			
65	24-V & 48-V Batt. Bd. Rm., E1. 669	2			
66	Communications Rm. E1. 669	4			
67	Communications Rm E1. 669	4			
68	Mech Equip. Rm E1. 669	2			
69	Mech. Equip. Rm. E1. 669			2	
70	Aux. Bldg. A5-A11, CoL.W-X, E1. 669	5			
71	Aux. Bldg. A5-A11, CoL.W-X, E1. 669	5			
72	Aux. FW Pump Turbine 1A-S, El. 669	1			
73	Aux. FW Pump Turbine 1A-S, El. 669			1	
74	Aux. FW Pump Turbine 2A-S, El. 669	1			
75	Aux. FW Pump Turbine 2A-S, El. 669			1	
76	S. I. & Charging Pump Rms. El. 669			5	
77	S. I. Pump Rm. 1A, El. 669	1			
78	S. I. Pump Rm 1B, El. 669	1			
79	Charging Pump Rm. 1C, El. 669	1			
80	Charging Pump Rm. 1B, El. 669	1			
81	Charging Pump Rm. 1A, El. 669	1			
82	S. I. & Charging Pump Rms. El. 669			5	
83	S. I. Pump Rm. 2A, El. 669	1			
84	S. I. Pump Rm. 2B, El. 669	1			
85	Charging Pump Rm. 2A, El. 669	1			
86	Charging Pump Rm. 2B, El. 669	1			
87	Charging Pump Rm. 2C, El. 669	1			
88	Aux. Bldg. Corridor A1-A8, E1. 669	8			
89	Aux. Bldg. Corridor A1-A8, E1. 669	8			
90	Aux. Bldg. Corridor A8-A15, E1. 669	8			
91	Aux. Bldg. Corridor A8-A15, E1. 669	8			
92	Aux. Bldg. Corridor Col. U-W, E1. 669	4			
93	Aux. Bldg. Corridor Col. U-W, El. 669	4			

TABLE 3.3-11 Rev. 11
MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
94	Valve Galley, El. 669	2			
95	Valve Galley, El. 669	2			
96	U/2 Valve Galley, El. 669	2			
97	U/2 Valve Galley, El. 669	2			
98	U/1 Cntmt Purge Air Fltr., El. 690		2	2	
99	U/1 Cntmt Purge Air Fltr., El. 690		2	2	
100	U/2 Cntmt Purge Air Fltr., El. 690		2	2	
101	U/2 Cntmt Purge Air Fltr. El. 690		2	2	
102	U/1 Pipe Gallery, El. 690	4			
103	U/1 Pipe Gallery, El. 690	4			
104	U/2 Pipe Gallery, El. 690	4			
105	U/2 Pipe Gallery, El. 690	4			
106	Aux. Bldg., E1. 690	8			
107	Aux. Bldg., E1. 690	8			
108	Radio Chemical Lab. Area, E1. 690	3			
109	Radio Chemical Lab. Area, E1. 690	3			
110	Aux. Bldg. A1-A8, Col. Q-U, E1. 690	10			
111	Aux. Bldg. A1-A8, Col. Q-U, E1. 690	10			
112	Aux. Bldg A8-A15, Col. Q-U, E1. 690	9			
113	Aux. Bldg. A8-A15, Col. Q-U, E1. 690	9			
114	Waste Pkg. Area, E1. 706	3			
115	Waste Pkg. Area E1. 706	3			
116	Cask Loading Area E1. 706			4	
117	Cask Loading Area E1. 706			4	
118	New Fuel Storage Area E1. 706	2			
119	New Fuel Storage Area E1. 706	2			
120	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1	
121	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1	
122	Add. Eqpt. Bldg., E1. 706 & 717.5	6			
123	Volume Cont. Tank Rm. 1A, El. 690	1	1		
124	Additional Equip. Bldg E1. 706	6			
125	Volume Cont. Tank Rm. 1A, El. 690	1	1		
126	ABGTS Rm. E1. 714	2			
127	ABGTS Rm. E1. 714	2			
128	ABGTS Rm. E1. 714	2			
129	ABGTS Rm E1. 714	2			
130	Ventilation & Purge Air Rm. E1. 714	3			
131	Ventilation & Purge Air Rm. E1. 714	3			
132	Ventilation & Purge Air Rm. E1. 714	3			
133	Ventilation & Purge Air Rm. E1. 714	3			
134	Aux. Bldg. A5-A11, Col. U-W, E1. 714	7			
135	Aux. Bldg. A5-A11, Col. U-W, E1. 714	7			
136	Heating & Vent. Rm. E1. 714	4			
137	Heating & Vent. Rm. E1. 714	4			
138	Heating & Vent. Rm. E1. 714	4			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
139	Heating & Vent. Rm. E1. 714	5			
140	Above Hot Instr. Rm. El. 714	1			
141	Above Hot Instr. Rm. E1. 714	1			
142	Aux. Bldg. A1-A8, Col. Q-U, E1. 714	12			
143	Aux. Bldg. A1-A8, Col. Q-U, E1. 714	12			
144	Aux. Bldg. A8-A15, Col. Q-U, E1. 714	9			
145	Aux. Bldg. A8-A15, Col. Q-U, E1. 714	9			
146	N_2 Storage Area, E1. 706	4			
147	ABGTS filter, E1. 714		1	1	
148	ABGTS Filter, E1. 714		1	1	
149	Cable Spreading Rm. C3-C7, E1. 706	15			
150	Cable Spreading Rm. C3-C7, E1. 706	15			
151	VCT Room 2A, EL. 690	1	1		
152	VCT Room 2A, EL. 690	1	1		
153	Add. Eqpt. Bldg. E1. 740.5	4			
154	Add. Eqpt. Bldg. E1. 740.5	6			
155	Refuel Rm. E1. 734	19			
156	U/1 RB Access Rm. El. 734	2			
157	U/1 RB Access Rm. El. 734	2			
158	U/2 RB Access Rm. El. 734	2			
159	U/2 RB Access Rm. El. 734	2			
160	SG Blwdn. Rm. E1. 734	4			
161	SG Blwdn. Rm. E1. 734	4			
162	EGTS Rm. E1. 734	3			
163	EGTS Rm. E1. 734	3			
164	EGTS Fltr. A E1. 734		1	2	
165	EGTS Fltr. A E1. 734		1	2	
166	EGTS Fltr. B E1. 734		1	2	
167	EGTS Fltr. B E1. 734		1	2	
172	Mech. Eqpt. Rm. E1. 734	1			
173	Mech. Eqpt. Rm. E1. 734	1			
174	Mech. Eqpt. Rm. E1. 734	1			
175	Mech. Eqpt. Rm. E1. 734	1			
176	480-V Shtdn. Bd. Rm. 1A1, E1. 734	2			
177	480-V Shtdn. Bd. Rm. 1A1, E1. 734	2			
178	480-V Shtdn. Bd Rm. 1A2, E1. 734	2			
179	480-V Shtdn. Bd Rm. 1A2, E1. 734	2			
180	480-V Shtdn. Bd. Rm. 1B1, E1. 734	2			
181	480-V Shtdn. Bd. Rm. 1B1 E1. 734	2			
182	480-V Shtdn. Bd. Rm. 1B2 E1. 734	3			
183	480-V Shtdn Bd. Rm. 1B2 E1. 734	3			
184	6.9-KV Shtdn. Bd. Rm. A	7			
185	6.9-KV Shtdn. Bd Rm A	7			
186	6.9-KV Shtdn. Bd Rm. B	7			
187	6.9-KV Shtdn. Bd. Rm. B	7			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
188	480-V Shtdn. Bd. Rm. 2A1 E1. 734	2			
189	480-V Shtdn. Bd. Rm. 2A1 E1. 734	2			
190	480-V Shtdn. Bd. Rm 2A2 E1. 734	3			
191	480-V Shtdn. Bd. Rm. 2A2 E1. 734	3			
192	480-V Shtdn. Bd Rm. 2B1 E1. 734	2			
193	480-V Shtdn. Bd Rm. 2B1 E1. 734	2			
194	480-V Shtdn. Bd Rm. 2B2 E1. 734	2			
195	480-V Shtdn. Bd. Rm. 2B2 E1. 734	2			
196	125-V Batt. Bd. Rm. I E1. 734	1			
197	125-V Batt. Bd. Rm. I E1. 734	1			
198	125-V Batt. Bd. Rm II E1. 734	1			
199	125-V Batt. Bd. Rm. II E1. 734	1			
200	125-V Batt. Bd. Rm. III E1. 734	1			
201	125-V Batt. Bd. Rm. III E1. 734	1			
202	125-V Batt. Bd. Rm. IV E1. 734	1			
203	125-V Batt. Bd Rm. IV E1. 734	1			
204	Aux. CR E1. 734	2			
205	Aux. CR E1. 734	2			
206	Aux. CR Inst. Rm. 1A E1. 734	1			
207	Aux. CR Inst. Rm. 1A E1. 734	1			
208	Aux. CR Inst. Rm. 1B E1. 734	1			
209	Aux. CR Inst. Rm. 1B E1. 734	1			
210	Aux. CR Inst. Rm. 2A E1. 734	1			
211	Aux. CR Inst. Rm 2A E1. 734	1			
212	Aux. CR Inst. Rm. 2B E1. 734	1			
213	Aux. CR Inst. Rm. 2B E1. 734	1			
214	Mech. Eqpt. Rm. E1. 732	5			
215	Mech. Eqpt. Rm. E1. 732	5			
216	CR Fltr. B E1. 732	1		1	
217	CR Fltr. B E1. 732	1		1	
218	CR Fltr. A E1. 732	1		1	
219	CR Fltr. A E1. 732	1		1	
220	Main CR E1. 732	25			
221	Technical Support Center, E1. 732	5			
222	Technical Support Center, E1. 732	5			
225	Relay Bd. Rm. E1. 732	13			
226	Electric Cont. Bds. E1. 732	11			
227	Oper. Living Area E1. 732	7		1	
228	Oper. Living Area E1. 732			8	
229	Main Cont. Bds E1. 732	9			
230	Aux. CR Bds. L-4A, 4C, 11A & 10, E1. 734	10			
233	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
234	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
235	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
236	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
237	Mech Eqpt. Rm. E1. 749	1			
238	Mech. Eqpt. Rm. E1. 749	1			
239	Mech Eqpt. Rm. E1. 749	2			
240	Mech. Eqpt. Rm. E1. 749	2			
241	480-V XFMR Rm. 1A E1. 749	3			
242	480-V XFMR Rm. 1A E1. 749	3			
243	480-V XFMR Rm. 1B E1. 749	3			
244	480-V XFMR Rm. 1B E1. 749	3			
245	480-V XFMR Rm. 2A E1. 749	3			
246	480-V XMFR Rm. 2A E1. 749	3			
247	480-V XMFR Rm. 2B E1. 749	3			
248	480-V XMFR Rm. 2B E1. 749	3			
249	125-V Batt Rm. I E1. 749	1			
250	125-V Batt. Rm. I E1. 749	1			
251	125-V Batt. Rm. II E1. 749	1			
252	125-V Batt. Rm. II E1. 749	1			
253	125-V Batt. Rm. III E1. 749	1			
254	125-V Batt. Rm. III E1. 749	1			
255	125-V Batt. Rm. IV E1. 749	1			
256	125-V Batt. Rm. IV E1. 749	1			
257	480-V Bd. Rm. 1B E1. 749	4			
258	480-V Bd. Rm. 1B E1. 749	4			
259	480-V Bd. Rm. 1A E1. 749	4			
260	480-V Bd. Rm. 1A E1. 749	4			
261	480-V Bd. Rm. 2A E1. 749	4			
262	480-V Bd. Rm. 2A E1. 749	4			
263	480-V Bd. Rm. 2B E1. 749	4			
264	480-V Bd. Rm. 2B E1. 749	4			
267	Aux. Inst. Rm E1. 685	8			
268	Aux. Inst. Rm. E1. 685			9	
269	Computer Rm. E1. 685	4			
270	Computer Rm. E1. 685			4	
271	Aux. Instr. Rm. E1. 685	8			
272	Aux. Instr. Rm. E1. 685			9	
273	Computer Rm. Corridor	3			
276	Intk. Pump Sta. E1. 690 & 670.5	15			
277	ERCW Pump Sta E1. 704	21		8	
296	Aux. CR Bds. L-4B, 4D, & 11B, El. 734	6			
297	Main Cont. Bds.	9			
298	Common Main CR Bds. El 732	9			
330	U/1 Reactor Building Annulus		3		
331	U/1 Reactor Building Annulus		4		
332	U/2 Reactor Building Annulus		3		
333	U/2 Reactor Building Annulus		4		
352	U/1 Lwr. Compt. Coolers, E1. 693		4		

TABLE 3.3-11 Rev. 11

MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
353	U/2 Lwr. Compt. Coolers, E1. 693		4		
354	U/1 Upr. Compt. Coolers, E1. 778		4		
355	U/2 Upr. Compt. Coolers, E1. 778		4		
356	U/1 RCP 2, E1. 693			2	
357	U/1 RCP 2, E1. 693			2	
358	U/2 RCP 2, E1. 693			2	
359	U/2 RCP 2, E1. 693			2	
360	U/1 RCP 1, E1. 693			2	
361	U/1 RCP 1, E1. 693			2	
362	U/2 RCP 1, E1. 693			2	
363	U/2 RCP 1, E1. 693			2	
364	U/1 RCP 3, E1. 693			2	
365	U/1 RCP 3, E1. 693			2	
366	U/2 RCP 3, E1. 693			2	
367	U/2 RCP 3, E1. 693			2	
368	U/1 RCP 4, E1. 693			2	
369	U/1 RCP 4, E1. 693			2	
370	U/2 RCP 4, E1. 693			2	
371	U/2 RCP 4, E1. 693			2	
372	U/1Reactor Bldg. Annulus		22		
373	U/1 Reactor Bldg. Annulus		21		
374	U/2 Reactor Bldg Annulus		20		
375	U/2 Reactor Bldg. Annulus		19		
387	Turbine Cont. Bldg. Wall, E1. 706			19	
427	125V Batt. Rm. V E1. 749	2			
428	125V Batt. Rm. V E1. 749	2			
458	Counting Room Ceiling E1. 690	2			
462	480V Sd Bd Rm 1B2 E1. 734			1	
463	480V Sd Bd Rm 2A2 E1. 734			1	
465	Counting Room Ceiling E1. 690	2			
466	480V Sd Bd Rm 1B2 E1. 734			1	
467	480V Sd Bd Rm 1B2 E1. 734			1	
468	480V Sd Bd Rm 1B2 E1. 734			1	
469	480V Sd Bd Rm 2A2 E1. 734			1	
470	480V Sd Bd Rm 2A2 E1. 734			1	
471	480V Sd Bd Rm 2A2 E1. 734			1	
520	U1 AB General Supply Duct, El. 714		1		
521	U1 AB General Supply Duct, El. 714		1		
522	U2 AB General Supply Duct, El. 714		1		
523	U2 AB General Supply Duct, El. 714		1		
545	Hot Tool Rm. El. 669	4			
547	BAT Area Rm. A01, El. 690	2			
548	BAT Area Rm. A01, El. 690	2			
600	U1 Post Accident Sampling Facility El 706.0	1			
601	U1 Post Accident Sampling Facility El 706.0	1			

TABLE 3.3-11

MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
602	U2 Post Accident Sampling Facility El 706.0	1			
603	U2 Post Accident Sampling Facility El 706.0	1			

14 2 FIRE SUPPRESSION WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11.1 The fire protection water supply system shall be OPERABLE with:

a. Two fire pumps, each with a capacity of 1648 gpm at 130 psid, with suction aligned to the water storage tanks, and discharge aligned to the distribution piping.

b. Two water storage tanks, each with a minimum contained volume of 300,000 gals, and

c. An OPERABLE flow path from the water storage tanks through distribution piping, sectionalizing control or isolation valves, up to but not including the first valve off the loop header that isolate:
   1. Spray and/or sprinkler systems required to be OPERABLE per Section 3.7.11.2
   2. Hose standpipes required to be OPERABLE per Section 3.7.11.4.

APPLICABILITY: At all times.

ACTION:

a. With one pump and/or one water storage tank INOPERABLE, restore the inoperable equipment to OPERABLE status within seven (7) days, or perform corrective actions / reportability reviews in accordance with site administrative procedures outlining the plans and procedures to be used to restore the inoperable equipment to OPERABLE status or to provide an alternate backup pump or supply.

b. With no fire pumps or no water storage tanks OPERABLE:

   1. Establish a backup fire protection water supply system within twenty-four (24) hours.

   2. When ACTION 3.7.11.1.b.1 cannot be met, within one (1) hour action shall be initiated to place the unit(s) in:
      a. At least HOT STANDBY within the next six (6) hours,
      b. At least HOT SHUTDOWN within the following six (6) hours, and
      c. At least COLD SHUTDOWN within the subsequent twenty-four (24) hours.

c. With the fire suppression water system INOPERABLE for reasons other than loss of fire pumps or water storage tanks:

   1. Enter the applicable LCO of Section 3.7.11.2 and/or 3.7.11.4 for those systems with no OPERABLE flow path available.

14.2 FIRE SUPPRESSION WATER SYSTEM

SURVEILLANCE REQUIREMENTS

4.7.11.1.1 The fire suppression water system shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the contained water supply volume,

b. At least once per 31 days by starting the electric motor-driven pump and operating it for at least 15 minutes,

c. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

d. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

e. At least once per 18 months by performing a system functional test which includes simulated automatic actuation of the system throughout its operating sequence, and:

   1. Verifying that each fire pump develops at least 1648 gpm at a pump differential pressure head of 130 psig,

   2. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and

   3. Verifying that each fire pump starts automatically to maintain Fire Protection Water System pressure.

f. At least once per 3 years by performing a flow test of the system in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association.

4.7.11.1.2 The diesel-driven fire pump system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying:

   1) The fuel storage tank contains at least 50% full volume,

   2) The diesel starts from ambient conditions and operates for at least 30 minutes,

b. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank is within acceptable limits when checked for viscosity and water and sediment, and

c. At least once per 18 months by subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for the class of service.

4.7.11.1.3 The diesel-driven fire pump starting 24-volt battery bank and charger shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that:

   1) The electrolyte level if each battery is above the plates, and

   2) The overall battery voltage is greater than or equal to 24 volts.

b. At least once per 92 days by verifying that the specific gravity is appropriate for continued service of the battery, and

c. At least once per 18 months by verifying that:

   1) The batteries, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration, and

   2) The battery-to-battery and terminal connections are clean, tight, free of corrosion, and coated with anticorrosion material.

14.3 SPRAY AND/OR SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building -Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corridor Area.

e. Turbine Building - Control Building Wall.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour, establish backup fire suppression.

b. Restore the system to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path, excluding those valves in the Reactor Buildings, is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

14.3 SPRAY AND/OR SPRINKLER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months:

1. By performing a system functional test which includes simulated automatic actuation of the system, and:

   a) Verifying that the automatic valves in the flow path actuate to their correct positions on a cross zone or single zone detection test signal as designed, and

   b) Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.

   c) Verifying that each valve (manual, power operated or automatic) in the flow path, located in the Reactor Buildings, is in its correct position.

2. By visual inspection of the dry pipe, spray and sprinkler headers to verify their integrity, and

3. By visual inspection of each nozzle's spray area to verify the spray pattern is not obstructed.

14.4 CO_2 SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.3 The following low pressure CO2 systems shall be OPERABLE.

a. Computer Room.

b. Auxiliary Instrument Rooms.

c. Diesel Generator Rooms.

d. Fuel Oil Pump Room.

e. Diesel Generator Building Electrical Board Rooms.
f. Diesel Generator Building Lube Oil Storage Room

APPLICABILITY: Whenever equipment protected by the CO_2 systems is required to be OPERABLE.

ACTION:

a. With one or more of the above required CO_2 systems inoperable, within one hour, establish backup fire suppression.

b. Restore the system to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.3.1 Each of the above required CO_2 systems shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

4.7.11.3.2 Each of the above required low pressure CO_2 systems shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the CO_2 storage tank level to be greater than 50% and pressure to be greater than 270 psig, and

b. At least once per 18 months by verifying:

1. The system valves and associated ventilation dampers and fire door release mechanisms actuate manually and automatically, upon receipt of a simulated actuation signal, and

2. Flow from each nozzle during a "Puff Test."

14.5 FIRE HOSE STATIONS

LIMITING CONDITION FOR OPERATION

3.7.11.4 The fire hose stations shown in Table 3.7-5 shall be OPERABLE.

APPLICABILITY: Whenever equipment in the areas protected by the fire hose stations is required to be OPERABLE.

ACTION:

a. With one or more of the fire hose stations shown in Table 3.7-5 inoperable, route an additional equivalent capacity fire hose to the unprotected area(s) from an OPERABLE hose station within one (1) hour if the inoperable fire hose is the primary means of fire suppression; otherwise route the additional hose within twenty-four (24) hours. Fire hoses for the hose stations shown in Sections (a) - (d) of Table 3.7-5 shall be attached by the Fire Brigade as needed, and are not required to be permanently installed at the hose stations. For all hose stations shown in Table 3.7-5, restore the inoperable fire hose station(s) to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.4 Each of the fire hose stations shown in Table 3.7-5 shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve in the flow path, excluding those valves located in the Reactor Building, is in its correct position.
b. At least once per 92 days by visual inspection of the stations accessible during plant operations, excluding those stations located in the Reactor Buildings, to assure all required equipment is at the station.
c. At least once per 12 months by cycling each testable valve in the flow path, excluding those valves located in the Reactor Buildings, through at least one complete cycle of full travel.
d. At least once per 18 months by:
    1. Visual inspection of the stations located in the Reactor Buildings to assure all required equipment is at the station,
    2. Removing the hose for inspection and re-racking,
    3. Inspecting all gaskets and replacing any degraded gaskets in the couplings,
    4. Verifying that each valve in the flow path, located in the Reactor Buildings, is in its correct position,
    5. Cycling each valve in the flow path, that is inaccessible during normal plant operation and is located in the Reactor Buildings, through at least one complete cycle of full travel.
    6. Verifying that the automatic valves in the flow path actuate to their correct positions, as designed.
e. At least once per 3 years by:
    1. Partially opening each hose station valve to verify valve OPERABILITY and no flow blockage.
    2. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above maximum fire main operating pressure, whichever is greater.

TABLE 3.7-5
FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
a. Unit 1 Reactor Building - Annulus Area		
Platform	778.5	1-26-1196
Platform	778.5	1-26-1197
Platform	778.5	1-26-1198
Platform	778.5	1-26-1199
Platform	759.5	1-26-1200
Platform	759.5	1-26-1201
Platform	759.5	1-26-1202
Platform	759.5	1-26-1203
Platform	740.5	1-26-1204
Platform	740.5	1-26-1205
Platform	740.5	1-26-1206
Platform	740.5	1-26-1207
Platform	721.5	1-26-1208
Platform	721.5	1-26-1209
Platform	721.5	1-26-1210
Platform	721.5	1-26-1211
Platform	701.5	1-26-1212
Platform	701.5	1-26-1213
Platform	701.5	1-26-1214
Platform	701.5	1-26-1215
Platform	679.78	1-26-1216
Platform	679.78	1-26-1217
Platform	679.78	1-26-1218
Platform	679.78	1-26-1219
b. Unit 1 Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	1-26-1220
Reactor Building	679.78	1-26-1221
Reactor Building	679.78	1-26-1222
Reactor Building	679.78	1-26-1223
Reactor Building	679.78	1-26-1224
Reactor Building	679.78	1-26-1225

LOCATION	ELEVATION	HOSE RACK#
c. Unit 2 Reactor Building - Annulus Area		
Platform	778.0	2-26-1196
Platform	778.0	2-26-1197
Platform	778.0	2-26-1198
Platform	778.0	2-26-1199
Platform	759.0	2-26-1200
Platform	759.0	2-26-1201
Platform	759.0	2-26-1202
Platform	759.0	2-26-1203
Platform	740.0	2-26-1204
Platform	740.0	2-26-1205
Platform	740.0	2-26-1206
Platform	740.0	2-26-1207
Platform	721.0	2-26-1208
Platform	721.0	2-26-1209
Platform	721.0	2-26-1210
Platform	721.0	2-26-1211
Platform	701.0	2-26-1212
Platform	701.0	2-26-1213
Platform	701.0	2-26-1214
Platform	701.0	2-26-1215
Platform	679.78	2-26-1216
Platform	679.78	2-26-1217
Platform	679.78	2-26-1218
Platform	679.78	2-26-1219
d. Unit 2 Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	2-26-1220
Reactor Building	679.78	2-26-1221
Reactor Building	679.78	2-26-1222
Reactor Building	679.78	2-26-1223
Reactor Building	679.78	2-26-1224
Reactor Building	679.78	2-26-1225

LOCATION	ELEVATION	HOSE RACK#
e. Control Building		
Control Building	732	0-26-1186
Control Building	732	0-26-1191
Control Building	706	0-26-1187
Control Building	706	0-26-1192
Control Building	685	0-26-1188
Control Building	685	0-26-1193
Control Building	669	0-26-1189
Control Building	669	0-26-1194
f. Diesel Generator Building		
Corridor	722	0-26-1077
Corridor	740.5	0-26-1080
Air Exhaust Rm.	740.5	0-26-1082
Lube Oil Storage Room 722.0-2	722	0-26-2337
g. Additional Equipment Building - Unit 1		
South Wall	740.5	1-26-687
South Wall	706	1-26-686
h. Additional Equipment Building - Unit 2		
North Wall	740.5	2-26-687
North Wall	706	2-26-686

LOCATION	ELEVATION	HOSE RACK#
i. Auxiliary Building		
	759	1-26-669
	759	2-26-669
	749	2-26-664
	749	1-26-664
	734	2-26-670
	734	0-26-684
	734	1-26-670
	734	0-26-682
	734 Siamese Outlet	1-26-671 and 1-26-672
	734 Siamese Outlet	2-26-671 and 2-26-672
	734	1-26-665
	734	2-26-665
	714	0-26-660
	714	1-26-666
	714	2-26-666
	714	0-26-677
	706	0-26-658
	690	0-26-690
	690	0-26-661
	690 Siamese Outlet	1-26-674 and 1-26-675
	690 Siamese Outlet	2-26-674 and 2-26-675
	690	1-26-667
	669	2-26-667
	669	1-26-668
	669	2-26-668
	669	0-26-662
	669	0-26-680
	653	0-26-663
	653	0-26-691
j. CCW Intake Pumping Station		
	690	0-26-866
	690	0-26-867
	690	0-26-868
	690	0-26-869
	690	0-26-870

LOCATION	ELEVATION	HOSE RACK#
k. ERCW Pumping Station		
	688	0-26-927
	688	0-26-926
	688	0-26-930
	704	0-26-931
	704	0-26-925
	704	0-26-928
	720	0-26-929
	720	0-26-924
	720	0-26-932

14 6 FIRE BARRIER PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.7.12 All fire barrier penetrations (including cable penetration barriers, fire doors and fire dampers) in fire zone boundaries protecting safety related areas shall be functional.

APPLICABILITY: At all times.

ACTION:

a. With one or more of the required fire barrier penetrations non-functional, within one hour restore the inoperable equipment or:

   1. Establish a continuous fire watch on at least one side of the affected barrier, where there is NO OPERABLE fire detection on either side of the affected barrier, or
   2. Verify the OPERABILITY of fire detection on one side of the non-functional fire barrier and establish an hourly fire watch, or
   3. If fire detection is OPERABLE on both sides of the effected barrier, then no compensatory actions are required.

b. Restore the non-functional fire barrier penetration(s) to functional status within 30 days. If not restored to OPERABLE within thirty (30) days, perform a review in accordance with the site corrective action procedures

SURVEILLANCE REQUIREMENTS

4.7.12 Each of the above required fire barrier penetrations shall be verified to be functional:

a. At least once per 18 months by a visual inspection

b. Prior to returning a fire barrier penetration to functional status following repairs or maintenance by performance of a visual inspection of the affected fire barrier penetration(s).

14.7 EMERGENCY BATTERY LIGHTING UNITS

LIMITING CONDITION FOR OPERATION

3.7.14 Emergency battery lighting units provided for FSSD shall be OPERABLE.

APPLICABILITY: Modes 1, 2, 3 or 4 on the Unit with the illuminated FSSD equipment required to be OPERABLE.

ACTION:

a. With any of the emergency battery lighting units provided for FSSD Inoperable, restore the Inoperable units to Operable status within 24 hours, or ensure alternate lighting is available.

b. Restore the Inoperable emergency battery lighting unit to Operable status within 14 days. If not restored to OPERABLE within 14 days, perform a review in accordance with site corrective action programs.

SURVEILLANCE REQUIREMENTS

4.7.14 Each of the above required emergency battery lighting units (EBL) shall be verified to be functional:

a. At least once per 92 days by performing a functional test and visual inspection of each EBL to verify proper operation and correct alignment of the lamps of the EBL as a unit by simulating a loss of power.

b. At least once per 18 months by performance of an 8 hour discharge test

BASES

14.1 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires. This capability is required in order to detect and locate fires in their early stages. Prompt detection of fires will reduce the potential for damage to safety related equipment and is an integral element in the overall facility fire protection program.

The fire detection system provides the ability to detect and alarm to a constantly attended location the presence of a fire, and in some instances to automatically actuate automatic fire suppression equipment. If the alarm function of the fire detection system is INOPERABLE, fire watches are required to be established to monitor the affected areas for fire conditions since this is the only means available to provide for detection and notification. If the automatic actuation of fire suppression equipment is INOPERABLE but the alarm function of the system remains OPERABLE it is appropriate to enter the LCO for INOPERABLE automatic suppression and provide a back up means of fire suppression. Fire watches are not specified in this case since the ability of the fire detection system to detect and alarm to a constantly attended location remains OPERABLE. If both the alarm function and the automatic actuation function of the system is INOPERABLE it is necessary to establish fire watches in accordance with the requirements of section 3.3.3.8 and to enter the applicable requirements of LCO 3.7.11.2 and/or LCO 3.7.11.3 and provide a back up means of fire suppression.

In cases where the fire detection alarm and notification function is INOPERABLE to a constantly attended location but remains OPERABLE at the local fire detection panels it is appropriate to establish the required fire watch compensatory measures either at the local fire detection panels or in the actual areas protected. In cases where the fire detection alarm and notification function is INOPERABLE at the local fire detection panel the required fire watch compensatory measures must be established in the areas protected.

Output from the fire detection system also provide for the automatic shutdown of selected plant fans/air movers and dampers. This output is beyond the scope of this LCO for the fire detection system since this automatic shutdown does not affect the operations of the system as exhibited by the annunciation of the associated fire detection equipment.

In the event that a portion of the fire detection instrumentation is inoperable, the establishment of continuous or roving fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY. The fire watch requirements for inoperable attendant fire detection equipment are for a continuous fire watch in areas where redundant systems or components could be damaged and an hourly fire watch in areas where redundant systems or components could not be damaged. An hourly roving fire watch is required for inoperable detection equipment that is alarm only, and does not have associated automatic suppression equipment.

The compensatory actions described in LCO 3.3.3.8 for loss of detection inside primary containment differ from those for other areas due to radiological conditions and potential hazards inside containment. .

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire detection instrumentation are met. All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

The restoration time of 14 days is reasonable based on the compensatory actions required for inoperable equipment. During unit outages it will sometimes be necessary to remove equipment from service for longer than 14 days to support outage related activities. These impairments will be excluded from the corrective action program review requirements for exceeding the 14 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all impairments and document the justification for extension past the 14 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.3.3.8 shall remain applicable.

Plant equipment such as EGTS, ABGTS, CREVS and containment purge which must be removed from service for fire detector testing is performed on an 18 month frequency to minimize outages of the equipment and to allow detector testing to be performed concurrent with outages of the equipment for other testing.

The supervision testing required by surveillance requirement 4.3.3.8.2 is needed since multiple faults on the looped, class A supervised wiring between the local panels and the alarm receiving console may prevent annunciation of alarms from one or more local panels. The testing verifies loop failure is annunciated when a single open is created, verifies alarm receipt capability when a single open or ground fault is created and verifies loss of communications is annunciated when communications between the console and a local panel is lost. The 6 month testing frequency is based on standard technical specifications and is adequate given the class A supervision provided and the two levels of trouble annunciation provided- loop failure and loss of communications. LCO action 3.3.3.8 a is not required to be established if the testing required by the surveillance requirement fails or if a loop failure is annunciated- instead, LCO action 3.3.3.8c is implemented. A loss of communications requires implementation of LCO action 3.3.3.8a for all required local panels which have lost communications with the alarm receiving console. Since any detector alarms will still be annunciated at the local panels, required fire watches may be posted at the local panels.

The testing of zones and unsupervised actuation circuits required by surveillance requirement 4.3.3.8.3 ensures zone alarm conditions simulated at the local panel results in the required detection system functions of alarm to a constantly attended location and, when required, actuation of required fire suppression equipment. The testing frequency for the zones is based on the code of record requirements and the potentially severe consequences of a zone module failure. The testing frequency for unsupervised actuation circuits is based on standard technical specifications.

BASES

14 2, 14.3, 14.4, 14 5 FIRE SUPPRESSION SYSTEMS

The OPERABILITY of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinguish fires occurring in any portion of the facility where safety related equipment is located. The fire suppression system consists of the water system, spray and/or sprinklers, CO_2, and fire hose stations. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety related equipment and is a major element in the facility fire protection program.

The fire protection water supply system consists of water storage tanks, pumps, and the necessary piping and valves to provide a flow path from the pumps to the end devices which consist of sprinkler/spray systems and hose standpipe systems. The water distribution system is looped to provide redundancy of the flow path. The closing of a single valve on the looped distribution piping will not cause the end device(s) to become inoperable. The closing of multiple valves in the looped distribution piping can completely isolate or degrade the flow path to the sprinkler/spray systems and the hose standpipe systems. When this situation occurs it is appropriate to enter the applicable LCO and comply with the action statement for the system(s) that is made inoperable by the condition.

In the event that portions of the fire suppression systems are inoperable, alternate backup fire fighting equipment is required to be made available in the affected areas until the inoperable equipment is restored to service. When the inoperable fire fighting equipment is intended for use as a backup means of fire suppression, a longer period of time is allowed to provide an alternate means of fire fighting than if the inoperable equipment is the primary means of fire suppression.

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire suppression systems are met. For fire suppression equipment located in the Reactor Buildings, the surveillance frequency of once per 18 months (refueling outage) is supported by the limited accessibility of this equipment, historical data from previous performances, ALARA and Industrial Safety concerns and is considered adequate.

In the event the fire suppression water system described by 3.7.11.1 becomes inoperable, immediate corrective measures must be taken since this system provides the major fire suppression capability of the plant. Reportability reviews/corrective actions performed in accordance with administrative procedures provides for prompt evaluation of the corrective measurers to ensure adequate fire suppression capability for the continued protection of the nuclear plant.

The restoration time of 14 days described by 3.7.11.2, 3.7.11.3, and 3.7.11.4 is reasonable based on the compensatory actions required for inoperable equipment. During unit outages it will sometimes be necessary to remove equipment from service for longer than 14 days to support outage related activities. These impairments will be excluded from the corrective action program review requirements for exceeding the 14 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all impairments and document the justification for extension past the 14 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.7.11.2, 3.7.11.3, and 3.7.11.4 shall remain applicable.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes.

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

Fire hoses in the Annulus and Containment areas for both units (Sections (a) - (d) of Table 3.7-5) are not required to be permanently installed at the hose stations. Surveillance Requirement 4.7.11.4 ensures that all equipment associated with the hose stations is operable. If necessary, Fire Brigade members can connect hoses to the hose stations connections using portable hose packs. Since plant personnel not specifically trained for fire fighting situations are instructed to immediately evacuate an area in which a fire occurs, and are not expected or desired to perform fire fighting activities, the absence of the hoses on the racks does not delay fire fighting measures. The removal of hoses from the Containment and Annulus areas is a good ALARA practice, since the hoses do not have to be removed and replaced every refueling outage, as well as a cost-effective measure due to expenses from contaminated waste removal, and costs due to equipment replacement.

BASES

14.6 FIRE BARRIER PENETRATIONS

The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. This design feature minimizes the possibility of a single fire rapidly involving several areas of the facility prior to detection and extinguishment. The fire barrier penetrations are a passive element in the facility fire protection program and are subject to periodic inspections.

Fire barrier penetrations, including cable penetration barriers, fire doors and dampers are considered functional when the visually observed condition is the same as the as-designed condition. For those fire barrier penetrations that are not in the as-designed condition, an evaluation shall be performed to show that the modification has not degraded the fire rating of the fire barrier penetration.

During periods of time when a barrier is not functional, either: 1) A continuous fire watch is required to be maintained in the vicinity of the affected barrier (if there is NO OPERABLE detection on either side of the affected barrier); or 2) The fire detectors on one side of the affected barrier must be verified OPERABLE and a hourly fire watch patrol established, until the barrier is restored to functional status. In cases where there is OPERABLE detection on both sides of the affected barrier, no fire watch is required. A fire watch is required for detection and notification of a fire to ensure early response, and with operable detection on both sides of an affected barrier, the placement of fire watches provides no additional fire protection function.

For ERFBS (e.g., Thermo-Lag, Kaowool, etc.) an hourly roving fire watch with OPERABLE detection in the affected area, or continuous fire watch with no OPERABLE detection in the affected area shall be maintained until upgrade work is complete as described in DCN's M-12743 & M-12744 (Thermo-Lag upgrade), and M-12745 & M-12746 (Kaowool replacement).

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes.

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

BASES

14.6 FIRE BARRIER PENETRATIONS (cont.)

The completion time of 30 days affords adequate time for the various cure times for the different fire barrier materials, procedural requirements for time between stages when multiple stages of installation are required, and inspection and/or testing of the barrier materials. This completion time is reasonable, based on the compensatory actions for continuous fire watches, or those pertaining to fire-rated assemblies/fire barriers used in conjunction with other fire protection features, such as fire detection.

The completion time of 30 days affords adequate time for the various cure times for the different fire barrier materials, procedural requirements for time between stages when multiple stages of installation are required, and inspection and/or testing of the barrier materials. This completion time is reasonable, based on the compensatory actions for continuous fire watches, or those pertaining to fire-rated assemblies/fire barriers used in conjunction with other fire protection features, such as fire detection.

During unit outages it will sometimes be necessary to breach some of the fire barriers for longer than 30 days for plant personnel and equipment access purposes. These breaches will be excluded from the corrective action program review requirements for exceeding the 30 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all breached fire barriers and document the justification for extension past the 30 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.7.12 shall remain applicable.

BASES

14.7 EMERGENCY BATTERY LIGHTING UNITS

Emergency battery lighting (EBL) units are required in areas needed for operation of safe shutdown equipment and in access and egress routes thereto in the event of a fire.

An ability to access and operate fire safe shutdown systems is required as well as the protection of such systems. These tasks must be capable of being performed in conjunction with the loss of normal lighting. To achieve this, emergency battery lighting units with 8 hour lighting capacity are provided.

FOR 3.7.14 uses the term "alternate battery lighting" for a temporary substitute for installed emergency battery lighting units. This "alternate battery lighting" generally refers to portable, hand-held lighting as addressed in Part V, Section 2.0, "Emergency Lighting" of this report.

The restoration of the equipment to OPERABLE status in 14 days is reasonable based on the type of equipment that is out of service.

The Surveillance Requirements (SR) verify proper operation of EBL units by simulating a loss of power. When manually actuated, normal AC power is interrupted to the EBL at the primary or secondary side of the step-down transformer. Thus, the EBL's ability to go from the float charge mode to the discharge mode is fully exercised. This functional test also demonstrates:

1) The EBL is configured for automatic operation and is not in the standby mode
2) The load transfer circuitry is functional
3) The lamps are functional
4) Continuity exists between the battery and all lamps
5) The battery is functional
6) The charging circuit is functional
7) The status indicators are functional

A visual inspection to assess the general condition of the EBL, is included. The inspection verifies proper alignment of the lamps (or in the case of multiple components the capability to be aligned) to ensure illumination of the fire safe shutdown equipment and/or access/egress paths.

The periodic 8 hour discharge test confirms the ability of the light unit to operate for eight (8) hours.

LIST OF FIGURES

(All drawings will be current active version)

LIST OF FIGURES
(Continued)

LIST OF FIGURES
(Continued)

(* Changes are to Figure Numbers Only)